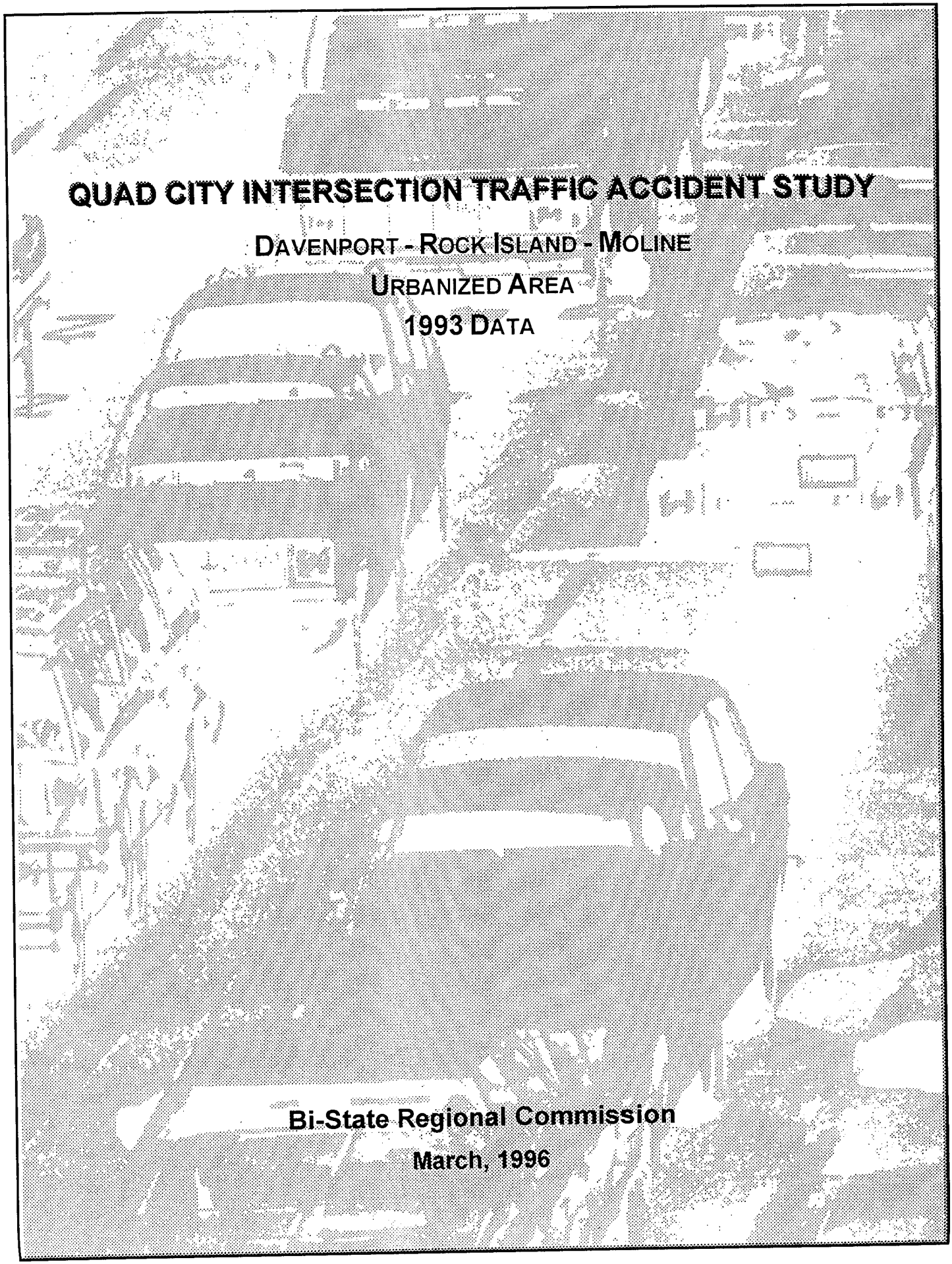

QUAD CITY INTERSECTION TRAFFIC ACCIDENT STUDY

DAVENPORT - ROCK ISLAND - MOLINE

URBANIZED AREA

1993 DATA

Bi-State Regional Commission

March, 1996

QUAD CITY

INTERSECTION TRAFFIC ACCIDENT STUDY

1993 DATA

This report was prepared in cooperation with the U.S. Department of Transportation, Federal Highway Administration; the Illinois Department of Transportation; and the Iowa Department of Transportation. The contents of this report reflect the views of the author who is responsible for the facts and the accuracy of the data presented herein. The contents do not necessarily reflect the official views or policies of the Illinois Department of Transportation, the Iowa Department of Transportation, or the Federal Highway Administration. This report does not constitute a standard, specification or regulation.

March, 1996
Bi-State Regional Commission
1504 Third Avenue
P. O. Box 3368
Rock Island, Illinois 61204-3368

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[2]Chairman, Transportation Policy Committee.

[3]Chairman, Bi-State Regional Commission.

[4]The mayors of the Cities of LeClaire, Eldridge, Riverdale, and Buffalo in the Iowa portion and Milan, Silvis, Coal Valley, Carbon Cliff, Hampton, Green Rock, Colona and Oak Grove in the Illinois portion select a representative from their jurisdictions (Iowa and Illinois separately) to represent them on the Policy and Technical Committees.

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[1]The Technical Committee system allows one vote per agency with delegated representative voting permitted in the absence of an agency's listed member. The City of Davenport has two votes.

[2]Small communities (under 10,000 population) have one joint vote each in Illinois and Iowa. The City of Silvis and Villages of Coal Valley, Carbon Cliff, Hampton, Milan, and Oak Grove in the Illinois portion are represented by a staff person from one of the communities.

[3]Chairman, Transportation Technical Committee.

NOTE: Additional membership may include advisory representatives from the Illinois and Iowa Departments of Transportation, planning and research engineers from the Illinois and Iowa Federal Highway Administration, and a community planning representative from the Federal Transit Administration Region VII.

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1. EXECUTIVE SUMMARY

The 1993 Quad City Intersection Traffic Accident Study provides a source of accident information through which state and local officials may examine and respond to changing traffic conditions in their jurisdiction. This report identifies and analyzes hazardous intersections in the Illinois and Iowa Quad City Area.

The ten highest ranked intersections in each state were identified through an evaluation process based on accident frequency, severity and rate. A tie in ranking in the Iowa Quad cities resulted in eleven intersections been included in the top list. These twenty-one locations were further analyzed using collision diagrams, pertinent conditions and accident history.

The year 1993 marked the first time that the same $500 property damage or any personal injury criterion was used by both Illinois and Iowa in accident reporting. This made it possible to rank accident locations for the entire Quad City Area. Table 1.0.1 presents the top ten accident intersections in the Quad Cities. Two locations tied for the number one ranking points. They were also the top location for their respective side of the Quad City Area (Illinois/Iowa).

The appendices included at the end of this study report provide cost estimates for typical intersection improvements and suggestions for possible causes and countermeasures for the prevailing problems at the critical locations.

Table 1.0.1 1993 Quad City Intersection Traffic Accident Study
Top Ten Accident Intersections

RANK	INTERSECTION LOCATION
1	**Eastern Ave. & U.S. 6/Kimberly Rd., Davenport**
1	**16th St. & 44th Ave. Dr., Moline**
3	Kennedy Dr. & 42nd Ave. (NFR), E.Moline
3	U.S. 61 SB/Welcome Way & Kimberly Rd., Davenport
5	41st St. & IL 5/J.Deere Expwy.,Moline
6	16th St. & IL 5/J.Deere Expwy., Moline
6	16th St. & 23rd Ave., Moline
8	3rd St. & Main St., Davenport
8	U.S. 67/State St. & Devil's Glen Rd., Bettendorf
8	12th St. & 12th Ave., Moline

2. INTRODUCTION

A major part of the surveillance effort for the urban transportation planning process in the Quad City Area involves the collection of data on traffic accidents occurring at major street and highway intersections. Accident information is an important factor from which to work towards the regional Transportation System Management objective of improving the safety of the local transportation system. Accident surveillance provides a source of information through which state and local officials may examine and respond to the changing traffic conditions of the existing street and highway network. It will also raise the awareness of drivers when traveling and the attention of police officers when patrolling. For these reasons, Bi-State Regional Commission has compiled this study report which examines the traffic safety performance of street and highway intersections in the Quad City Area in 1993.

The Quad City Intersection Traffic Accident Study for 1993 is the fourteenth such report prepared by the Bi-State Regional Commission. This year's report provides an analysis for intersections with seven or more accidents per location. For the ten highest ranked intersections in each state, collision diagrams were presented. These intersection diagrams demonstrate summary information on the number and type of collisions and the predominate accident pattern. In addition, the five-year accident history data is summarized for these intersections.

Field inspection was conducted to examine the consequential traffic conflicts at the top ranked locations. The most beneficial part of this analysis was the ability to examine the configuration of the intersection and examine its performance. Twenty-one (21) locations were inspected for 1993. Information derived from the field inspections was used in the summaries of the detailed analyses. References were provided at the end of this study report for countermeasure development and cost estimates for typical intersection improvements that geared toward prevailing problems at the critical locations.

Data for the 1993 Intersection Traffic Accident Study was provided by the Iowa Department of Transportation (IA DOT), Bureau of Transportation Safety, and the Illinois Department of Transportation (IL DOT), Division of Traffic Safety. The departments of transportation obtain their information from police and driver accident reports. The reporting criteria for both states are, for all accidents involving fatalities or personal injuries and/or property damage with an estimated value of $500 or more. In Illinois, prior to 1992 accidents were reported if they exceeded $250 in property damage. Information was also provided by the individual jurisdictions represented in the report.

The 1993 Intersection Traffic Accident Study also examines the current status of the 1992 top ranked intersections to determine the effect of any improvements that were made at these locations.

3. METHODOLOGY

This Chapter describes the criteria, calculation of their value and evaluation points for ranking of the top accident locations. Based on the total number of accidents that can be analyzed in a timely manner, a cut-off line had to be established to select only those qualified locations from the complete accident data base. The 1993 accident study includes intersections that had seven (7) or more accidents that year.

There are three criteria used for the ranking of the accident intersections. They are Accident Frequency, Accident Severity and Accident Rate.

For each criterion, there is a scoring system awarding evaluation points to the intersections. Table 3.0.1 below provides a complete list of criterion ranges and the corresponding points.

TABLE 3.0.1
Evaluation Points For Ranking Accident Locations

Accident Frequency		Accident Severity		Accident Rate*	
Accidents	Points	Severity	Points	Rate (MEV)	Points
≥ 29	15	≥ 56	15	≥ 3.50	15
27 - 28	14	53 - 55	14	3.26 - 3.49	14
25 - 26	13	49 - 52	13	3.01 - 3.25	13
23 - 24	12	45 - 48	12	2.76 - 3.00	12
21 - 22	11	41 - 44	11	2.51 - 2.75	11
19 - 20	10	37 - 40	10	2.26 - 2.50	10
17 - 18	9	33 - 36	9	2.01 - 2.25	9
15 - 16	8	29 - 32	8	1.76 - 2.00	8
13 - 14	7	25 - 28	7	1.51 - 1.75	7
11 - 12	6	21 - 24	6	1.26 - 1.50	6
9 - 10	5	17 - 20	5	1.01 - 1.25	5
7 - 8	4	13 - 16	4	0.76 - 1.00	4
5 - 6	3	9 - 12	3	0.51 - 0.75	3
3 - 4	2	5 - 8	2	0.26 - 0.50	2
1 - 2	1	1 - 4	1	0.01 - .025	1

* Accident per million entering vehicles (MEV)

An explanation of these criteria is as follows.

3.1 Accident Frequency

This is the total number of accidents that occurred at each intersection in the subject year. It is frequently used for comparison in accident analysis. All intersections with seven or more reported accidents in 1993 are included in this study.

3.2 Accident Severity

Accidents are classified into three types: Property Damage Only (PDO), Personal Injury Accident and Fatal Accident. A value of 1, 3 or 12, respectively, is assigned to each type of accidents. The equation below illustrates the calculation formula:

$$S_i = (N_P*1) + (N_i*3) + (N_F*12)$$

Where:

S_i - Total weighted severity value for intersection i;
N_P - Number of Property Damage Only accidents at intersection i;
N_i - Number of Personal Injury Accidents at intersection i;
N_F - Number of Fatal Accidents at intersection i.

The total weighted severity values at each intersection is used to obtain the number of severity points found in Table 3.0.1. which is in turn used for ranking purposes.

3.3 Accident Rate

Accident rate for intersections is defined as the ratio of accident frequency over traffic volume for the subject time period. It is usually expressed in terms of accidents per million entering vehicles (MEV) for an intersection. The following formula is used in this study to calculate the intersection accident rates:

$$R_i = \frac{(A_i)(1{,}000{,}000)}{(T)(V_i)}$$

Where:

R_i - Accident rate expressed in accidents per million entering vehicles (MEV) for intersection i;
A_i - Number of accidents at intersection i during the subject year;
T - Time period in days (in this case, 365 days); and
V_i - The total of average daily traffic on all approaches entering the intersection.

3.4 Total Score and Ranking

The value of accident frequency, accident severity and accident rate calculated above was converted to their respective evaluation points or score useing Table 3.0.1. The sum of the evaluation points becomes the total score on which the ranking of top locations was based. This is detailed in Chapter 4.

4. HIGHEST ACCIDENT LOCATION ANALYSIS

The method discussed in Chapter 3 is applied here to analyze the intersections that meet the minimum seven accidents condition. With the sum of the scores of the three criteria, every intersection analyzed was ranked by state. The highest ranked top ten locations was created from these lists. Table 4.0.1 and Table 4.0.2 listed these top ranked locations for Illinois and Iowa, respectively. A tie in ranking resulted in eleven locations listed for Iowa. The total score column was calculated using Table 3.0.1 where points were assigned for the three criteria and then summed.

The eleven intersections on the Iowa top ten list were reponsible for a total of 253 accidents, of which 97 accidents resulted in 127 injured persons. The top ten intersections in the Illinois Quad Cities had a total of 233 accidents, of which 79 accidents resulted in 127 injured persons. There was no fatality from any of the above accidents.

In addition to its application in ranking top accident locations, accident rate is also used to pinpoint a location that has more accidents in relation to the traffic volume. In 1993 the average accident rate for all intersections with seven or more accidents is 1.66. While the accident rate for the top twenty-one intersections averages 2.44. The later will be used in Chapter 5 and 6 when each of the top locations are examined in detail.

Table 4.0.1 1993 Quad City Intersection Traffic Accident Study
Ten Highest Ranked Locations in Illinois

RANK	INTERSECTION LOCATION IN ILLINOIS	# OF ACCIDENTS	WEIGHTED SEVERITY	ACCIDENT RATE	TOTAL SCORE
1	16th St. & 44th Ave. Dr., Moline	27	35	4.02	38
2	Kennedy Dr. & 42nd Ave. (NFR), E.Moline	29	43	2.61	37
3	41st St. & IL 5/J.Deere Expwy.,Moline	28	62	1.73	36
4	16th St. & IL 5/J.Deere Expwy., Moline	28	48	2.01	35
4	16th St. & 23rd Ave., Moline	27	39	2.55	35
6	41st St. & 38th Ave./Coaltown Rd., Moline	19	33	4.93	34
7	7th St. & 42nd Ave. (NFR), E. Moline	23	43	2.05	32
8	12th St. & 12th Ave., Moline	13	21	3.63	28
9	19th St. (NB) & 23rd Ave.,Moline	18	36	1.44	24
9	11th St. & 42nd Ave. (NFR), E. Moline	17	27	1.99	24

Table 4.0.2 1993 Quad City Intersection Traffic Accident Study
Eleven Highest Ranked Locations in Iowa

RANK	INTERSECTION LOCATION IN IOWA	# OF ACCIDENTS	WEIGHTED SEVERITY	ACCIDENT RATE	TOTAL SCORE
1	Eastern Ave. & U.S. 6/Kimberly Rd., Davenport	31	57	1.78	38
2	U.S. 61 SB/Welcome Way & Kimberly Rd., Davenport	31	57	1.71	37
3	3rd St. & Main St., Davenport	21	29	4.39	34
3	U.S. 67/State St. & Devil's Glen Rd., Bettendorf	24	40	2.92	34
5	Locust St., Division St., & Hickory Grove Rd., Davenport	23	43	2.36	33
6	Marquette St. & Kimberly Rd., Davenport	23	37	1.86	30
7	35th St. & Marquette St., Davenport	17	31	2.81	29
7	53rd St. & U.S. 61 NB/Brady St., Davenport	21	43	1.59	29
9	Elmore Ave. & U.S. 6/Kimberly Rd., Davenport	22	38	1.32	27
9	Spring St. & U.S. 6/Kimberly Rd., Davenport	22	38	1.31	27
9	Locust St. & Iowa St., Davenport	18	32	2.31	27

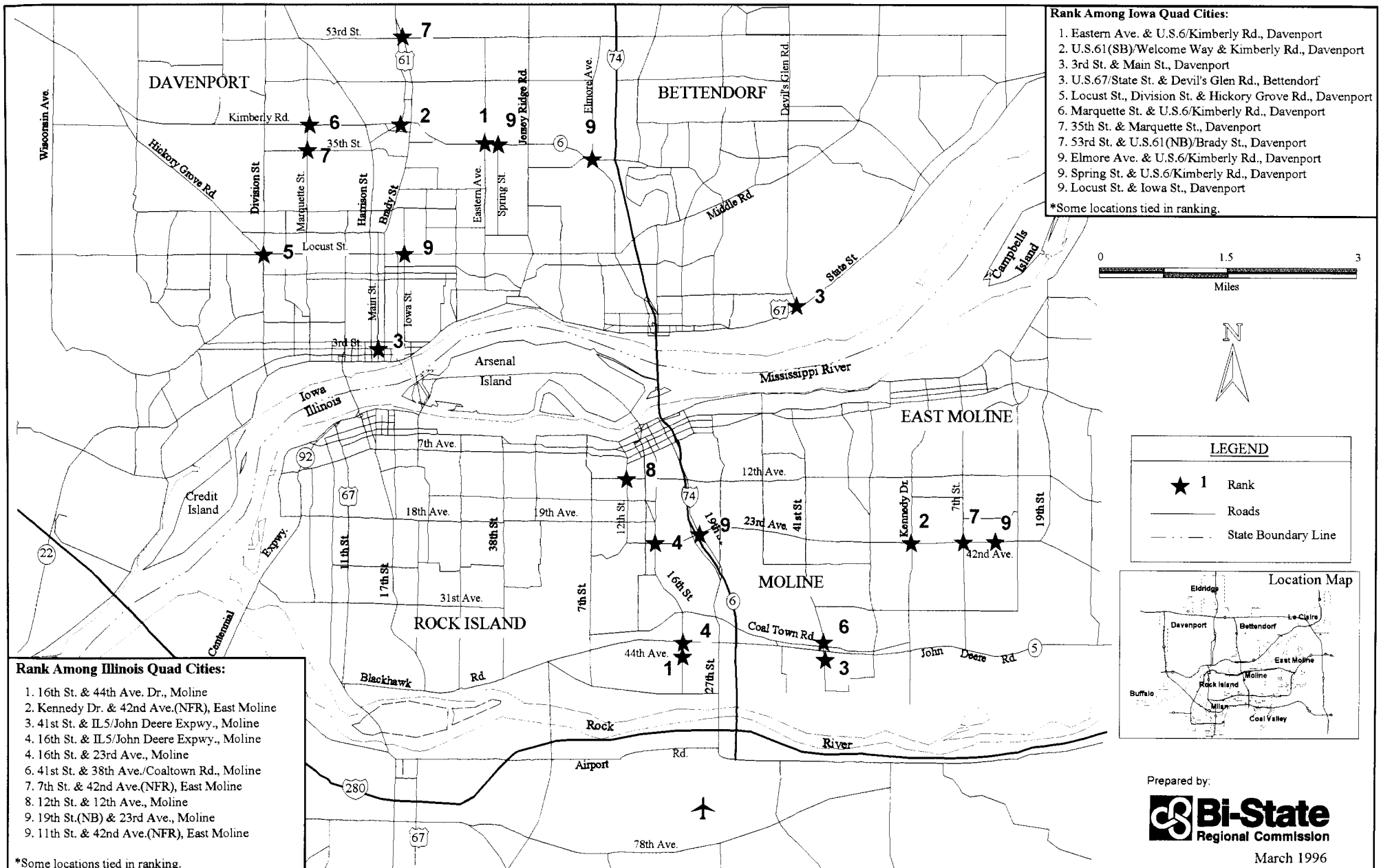
4.1 Top Accident Location Map

To better illustrate the distribution of the most critical accident intersections, an accident location map was created as shown in Figure 4.1.1. This includes the twenty-one top ranked intersections listed in Table 4.0.1 and Table 4.0.2.

4.2 Highest Accident Locations in Illinois & Iowa

As stated at the beginning of this Chapter, intersections with seven or more accidents were included in this study. Table 4.2.1 and Table 4.2.2 lists all intersections with seven or more accidents. Information in these tables includes the value for each criterion, evaluation points, total score and rank. It is hoped that the information presented here will give a general picture of the high accident locations in the area.

Figure 4.1.1 1993 Quad City Intersection Traffic Accident Study
Top Accident Location Map



Prepared by:

Bi-State Regional Commission

March 1996

TABLE 4.2.1 1993 HIGHEST INTERSECTION ACCIDENT LOCATIONS IN ILLINOIS QUAD CITIES

INTERSECTION LOCATION	# of ACCIDENTS		COMPOSITE SEVERITY		# of ACC. With INJURY	# of ACC. With FATALITY	ACCIDENT RATE		TOTAL SCORE	OVERALL RANKING
	ACC.	SCORE	SEV.	SCORE			RATE	SCORE		
16th St & 44th Av Dr, Mo.	27	14	35	9	4	0	4.02	15	38	1
Kennedy Dr & 42nd Av (NFR),E.M.	29	15	43	11	7	0	2.61	11	37	2
41st St & IL 5/J.Deere Expwy.,Mo.	28	14	62	15	17	0	1.73	7	36	3
16th St & IL 5/J.Deere Expwy., Mo.	28	14	48	12	10	0	2.01	9	35	4
16th St & 23rd Av, Mo.	27	14	39	10	6	0	2.55	11	35	4
41st St & 38th Av/Coaltown Rd, Mo.	19	10	33	9	7	0	4.93	15	34	6
7th St & 42nd Av (NFR), E.M.	23	12	43	11	10	0	2.05	9	32	7
12th St & 12th Av, Mo.	13	7	21	6	4	0	3.63	15	28	8
19th St (NB) & 23rd Av,Mo.	18	9	36	9	9	0	1.44	6	24	9
11th St & 42nd Av (NFR),E.M.	17	9	27	7	5	0	1.99	8	24	9
19th St & 4th Av, Mo.	12	6	20	5	4	0	2.94	12	23	11
38th St & IL 5/J.Deere Expwy.,Mo.	19	10	31	8	6	0	1.19	5	23	11
53rd St & IL 5/J.Deere Expwy.,Mo.	17	9	27	7	5	0	1.26	6	22	13
20th St & 5th Av, R.I.	9	5	15	4	3	0	2.37	10	19	14
7th St & 16th Av, Mo.	11	6	15	4	2	0	2.23	9	19	14
Kennedy Dr & 30th Av,E.M.	11	6	21	6	5	0	1.48	6	18	16
7th St & IL 5/J.Deere Expwy., Mo.	12	6	28	7	8	0	1.09	5	18	16
15th St & 2nd Av, R.I.	7	4	15	4	4	0	2.34	10	18	16
12th St & 4th Av, Mo.	8	4	16	4	4	0	2.25	9	17	19
7th St & 12th Av, Mo.	7	4	11	3	2	0	2.35	10	17	19
15th St & 6th Av, Mo.	9	5	15	4	3	0	1.89	8	17	19
17th St & 25th Av, R.I.	7	4	13	4	3	0	1.97	8	16	22
44th St & 7th Av,R.I.	8	4	14	4	3	0	1.42	6	14	23
19th St & 6th Av, Mo.	7	4	13	4	3	0	1.16	5	13	24
7th St & 19th Av, Mo.	9	5	13	4	2	0	0.92	4	13	24
27th St & 69th Av,Mo.	10	5	16	4	3	0	0.86	4	13	24
Kennedy Dr & 17th Av,E.M.	7	4	15	4	4	0	1.25	5	13	24
19th St (SB) & 23rd Av, Mo.	10	5	16	4	3	0	0.80	4	13	24
7th St & 30th Av,E.M.	8	4	16	4	4	0	1.07	5	13	24
16th St & 6th Av, Mo.	8	4	10	3	1	0	1.38	6	13	24
53rd St & 23rd Av,Mo.	9	5	11	3	1	0	0.78	4	12	31
41th St & 12th Av, Mo.	7	4	11	3	2	0	1.03	5	12	31
IL 92/Cent.Expwy & 78th Av,R.I.	7	4	11	3	2	0	1.18	5	12	31
41st St & 23rd Av, Mo.	8	4	18	5	5	0	0.63	3	12	31
12th St & 19th Av, Mo.	8	4	10	3	1	0	1.05	5	12	31
11th St & IL 5/Blackhawk Rd., R.I.	7	4	13	4	3	0	0.72	3	11	36
11th St & 31st Av,R.I.	7	4	13	4	3	0	0.76	3	11	36
24th St & 4th Av, R.I.	7	4	9	3	1	0	0.83	4	11	36
38th St & IL 5/Blackhawk Rd.,R.I.	8	4	10	3	1	0	0.81	4	11	36
38th St & 18th Av, R.I.	7	4	9	3	1	0	0.67	3	10	40
60th St & IL 5/J.Deere Expwy.,Mo.	7	4	11	3	2	0	0.62	3	10	40
19th St & 12th Av, Mo.	8	4	8	2	0	0	0.68	3	9	42
42nd St & 23rd Av, Mo.	8	4	14	4	3	0	N/A	N/A	N/A	N/A
48th St & 23rd Av,Mo.	7	4	13	4	3	0	N/A	N/A	N/A	N/A
27th St & 39th Av,Mo.	7	4	11	3	2	0	N/A	N/A	N/A	N/A

E.M. - East Moline; Mo. - Moline; R.I. - Rock Island; NFR - North Frontage Road; SB/NB - South/North Bound.

TABLE 4.2.2 1993 HIGHEST INTERSECTION ACCIDENT LOCATIONS IN IOWA QUAD CITIES

INTERSECTION LOCATION	# of ACCIDENTS		COMPOSITE SEVERITY		# of ACC. With	# of ACC. With	ACCIDENT RATE		TOTAL SCORE	OVERALL RANKING
	ACC.	SCORE	SEV.	SCORE	INJURY	FATALITY	RATE	SCORE		
Eastern Av & U.S. 6/Kimberly Rd, Dav.	31	15	57	15	13	0	1.78	8	38	1
U.S. 61 SB/Welcome Way & Kimberly Rd, Dav.	31	15	57	15	13	0	1.71	7	37	2
3rd St & Main St, Dav.	21	11	29	8	4	0	4.39	15	34	3
U.S. 67/State St & Devils Glen Rd, Bet.	24	12	40	10	8	0	2.92	12	34	3
Locust St, Division St, & Hickory Grove Rd, Dav	23	12	43	11	10	0	2.36	10	33	5
Marquette St & Kimberly Rd, Dav.	23	12	39	10	8	0	1.86	8	30	6
35th St & Marquette St, Dav.	17	9	31	8	7	0	2.81	12	29	7
53rd St & U.S. 61 NB/Brady St, Dav.	21	11	43	11	11	0	1.59	7	29	7
Elmore Av & U.S. 6/Kimberly Rd, Dav.	22	11	38	10	8	0	1.32	6	27	9
Spring St & U.S. 6/Kimberly Rd, Dav.	22	11	38	10	8	0	1.31	6	27	9
Locust St & Iowa St, Dav.	18	9	32	8	7	0	2.31	10	27	9
4th St & Pershing St, Dav.	11	6	17	5	3	0	3.50	15	26	12
Kirkwood Blvd. & Soo Line RR Overpass, Dav.	11	6	15	4	2	0	8.28	15	25	13
Jersey Ridge Rd & U.S. 6/Kimberly Rd, Dav.	18	9	38	10	10	0	1.09	5	24	14
Iowa St & Kirkwood Blvd., Dav.	9	5	19	5	5	0	3.43	14	24	14
U.S. 61 NB/Brady St & Kimberly Rd, Dav.	20	10	40	10	10	0	0.93	4	24	14
2nd St & Gaines St, Dav.	13	7	29	8	8	0	2.10	9	24	14
65th St & U.S. 61/Brady St, Dav.	18	9	28	7	5	0	1.80	8	24	14
Locust St & Marquette St, Dav.	16	8	32	8	8	0	1.49	6	22	19
53rd St & U.S. 61 SB/Welcome Way, Dav.	16	8	30	8	7	0	1.49	6	22	19
36th St & Division St, Dav.	11	6	29	8	9	0	1.61	7	21	21
Locust St & Gaines St, Dav.	14	7	24	6	5	0	1.90	8	21	21
36th St & Brady St, Dav.	13	7	25	7	6	0	1.54	7	21	21
U.S. 61 & Y48/County Rd, Scott Co.	10	5	22	6	6	0	2.41	10	21	21
53rd St & Division St, Dav.	11	6	23	6	6	0	2.19	9	21	21
3rd St & LeClaire St, Dav.	8	4	14	4	3	0	2.81	12	20	26
6th St & Main St, Dav.	8	4	12	3	2	0	3.13	13	20	26
Harrison St & Central Park Av, Dav.	13	7	31	8	9	0	1.21	5	20	26
35th St & Harrison St, Dav.	14	7	28	7	7	0	1.42	6	20	26
Lombard St & Marquette St, Dav.	9	5	21	6	6	0	1.92	8	19	30
14th St & Ripley St, Dav.	7	4	13	4	3	0	2.63	11	19	30
Locust St & Bridge Av, Dav.	13	7	23	6	5	0	1.23	5	18	32
Locust St & Brady St, Dav.	13	7	21	6	4	0	0.86	4	17	33
2nd St & Ripley St, Dav.	8	4	14	4	3	0	2.19	9	17	33
3rd St & Harrison St, Dav.	12	6	12	3	0	0	1.98	8	17	33
Devils Glen Rd & Middle Rd, Bet.	9	5	19	5	5	0	1.40	6	16	36
Brady St & Central Park Av, Dav.	12	6	20	5	4	0	1.09	5	16	36
Locust St & Washington St, Dav.	10	5	20	5	5	0	1.49	6	16	36
Locust St & Harrison St, Dav.	12	6	22	6	5	0	0.84	4	16	36
4th St & Division St, Dav.	9	5	17	5	4	0	1.46	6	16	36
Division St & IA 130/Northwest Blvd., Dav.	8	4	16	4	4	0	1.94	8	16	36
2nd St & Marquette St, Dav.	7	4	11	3	2	0	2.15	9	16	36
U.S. 61 & I-280 EB Ramp, Dav.	7	4	13	4	3	0	1.88	8	16	36
14th St & Gaines St, Dav.	7	4	17	5	5	0	1.70	7	16	36

TABLE 4.2.2 1993 HIGHEST INTERSECTION ACCIDENT LOCATIONS IN IOWA QUAD CITIES (cont'd)

INTERSECTION LOCATION	# of ACCIDENTS		COMPOSITE SEVERITY		# of ACC. With INJURY	# of ACC. With FATALITY	ACCIDENT RATE		TOTAL SCORE	OVERALL RANKING
	ACC.	SCORE	SEV.	SCORE			RATE	SCORE		
Stark St & River Dr, Dav.	7	4	17	5	5	0	1.63	7	16	36
23rd St/Spruce Hills Dr & Middle Rd, Bet.	9	5	17	5	4	0	1.02	5	15	46
Rockingham Rd & Pine St, Dav.	7	4	11	3	2	0	1.79	8	15	46
Marquette St & River Dr, Dav.	8	4	16	4	4	0	1.63	7	15	46
4th St & Warren St, Dav.	9	5	13	4	2	0	1.28	6	15	46
4th St & Gaines St, Dav.	9	5	13	4	2	0	1.28	6	15	46
Marquette St & Central Park Av, Dav.	10	5	16	4	3	0	1.49	6	15	46
U.S. 67 & I-80 EB Ramp, Le Claire	7	4	9	3	1	0	1.88	8	15	46
Division St & Kimberly Rd, Dav.	12	6	20	5	4	0	0.96	4	15	46
53rd St & Eastern Av, Dav.	8	4	18	5	5	0	1.21	5	14	54
53rd St & IA 130/Northwest Blvd., Dav.	8	4	16	4	4	0	1.46	6	14	54
U.S. 61 SB/Welcome Way & 42nd St, Dav.	9	5	21	6	6	0	0.72	3	14	54
12th St & U.S. 61/Brady St, Dav.	8	4	16	4	4	0	1.28	6	14	54
Fairmount St & Kimberly Rd, Dav.	8	4	10	3	1	0	1.52	7	14	54
6th St & Brady St, Dav.	7	4	15	4	4	0	1.49	6	14	54
3rd St & Warren St, Dav.	7	4	11	3	2	0	1.64	7	14	54
3rd St & Brady St, Dav.	8	4	10	3	1	0	1.51	7	14	54
I-74 WB Ramp & U.S. 6/Spruce Hills Dr, Bet.	10	5	16	4	3	0	0.90	4	13	62
3rd St & Ripley St, Dav.	7	4	15	4	4	0	1.23	5	13	62
13th St/I-74 Ramp & State St, Bet.	7	4	9	3	1	0	1.29	6	13	62
Locust St & Ripley St, Dav.	7	4	17	5	5	0	0.94	4	13	62
Locust St & Kimberly Rd, Dav.	9	5	17	5	4	0	0.72	3	13	62
Forest Rd & U.S. 6/Kimberly Rd, Dav.	9	5	17	5	4	0	0.67	3	13	62
18th St & Spruce Hills Dr, Bet.	7	4	15	4	4	0	1.03	5	13	62
Davenport Av & Kimberly Rd, Dav.	9	5	17	5	4	0	0.60	3	13	62
Locust St & Grand Ave, Dav.	7	4	13	4	3	0	0.89	4	12	70
Locust St & Main St, Dav.	7	4	13	4	3	0	0.80	4	12	70
35th St & Division St, Dav.	7	4	13	4	3	0	1.01	4	12	70
River Dr/U.S. 67 & McClelland Blvd, Dav.	7	4	17	5	5	0	0.76	3	12	70
U.S. 61/Brady St & Kirkwood Blvd, Dav.	8	4	12	3	2	0	1.18	5	12	70
14th St/I-74 Ramp & Grant St, Bet.	7	4	15	4	4	0	0.75	3	11	75
Locust St & Fairmount St, Dav.	7	4	7	2	0	0	1.24	5	11	75
14th St/I-74 Ramp & State St, Bet.	7	4	11	3	2	0	0.83	4	11	75
Locust St & N. Lincoln St, Dav.	7	4	7	2	0	0	0.91	4	10	78
Kimberly Rd & Pine St, Dav.	7	4	9	3	1	0	0.58	3	10	78
49th St & Pine St, Dav.	8	4	14	4	3	0	N/A	N/A	N/A	N/A

Dav. - Davenport; Bet. - Bettendorf; RR - Railroad; SB/NB - South/North Bound.

5. DETAILED ANALYSIS OF IOWA QUAD CITIES TOP LOCATIONS

In this Chapter, top ranked intersections in the Iowa Quad Cities are analyzed individually. This includes the eleven locations that are ranked highest 1993 (one additional location due to a tie in ranking). Each intersection was presented with an accident diagram and frequency of collision types. Frequency of accidents under circumstances such as time, day, week, month, lighting and/or road surface conditions during the collision is presented in graph form where trends were apparent. A performance table of each intersection in the past five years is shown as well. As discussed in Chapter 4, the average accident rate for the top twenty-one locations was 2.44. In this chapter, accident rates at each location are compared with this average accident rate.

5.1 Iowa Location #1 - Eastern Ave. & U.S. 6/Kimberly Rd., Davenport

Ranked first, this location experienced thirty-one (31) accidents in 1993. Thirteen (13) of which resulted in seventeen (17) injured persons. Taking into account the traffic volume, the accident rate for this intersection was below the average for all top locations at 1.78 accidents per MEV. Rear-end crashes were predominant in both east and west bound traffic flow as shown in Figure 5.1.1. Nearly eighty percent (78%) of the accidents happened during daylight hours while Saturday seemed to be the worst day of a week with over one third of the total accidents occurring that day (See Figure 5.1.2).

Eastern Avenue is a four-lane arterial with a posted speed limit of 35 mph. Kimberly Road (U.S. 6) is a four-lane divided major arterial with a posted speed limit of 45 mph. Left-turn lanes are provided at all approaches and right-turn lanes are available for Kimberly Road approaches. Only the Eastern Avenue approach has arrow markings showing the left-turn only lanes. Businesses along Eastern Avenue have driveways within proximity to the intersection. East bound traffic on Kimberly Road must pass a railroad track and a bridge before entering the right-turn lane. This maneuver could be abrupt considering the speed of traffic on the down slope from the west.

Table 5.1.1 recounts the accident history of this intersection for the past five years. It shows an upward trend of traffic accidents and predominantly rear-ended collisions. This intersection has ranked in the top ten list for at least the past five years.

Figure 5.1.1 Iowa Location # 1
Eastern Ave. & U.S.6/Kimberly Rd., Davenport

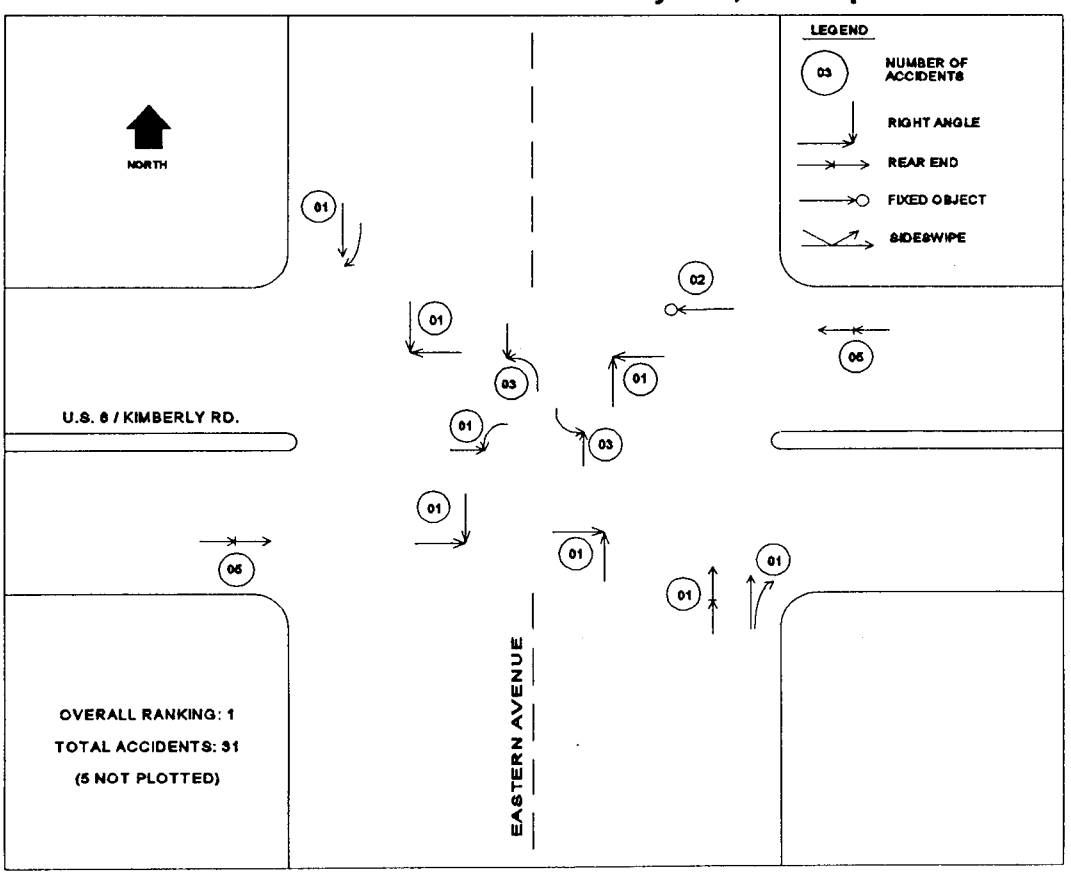
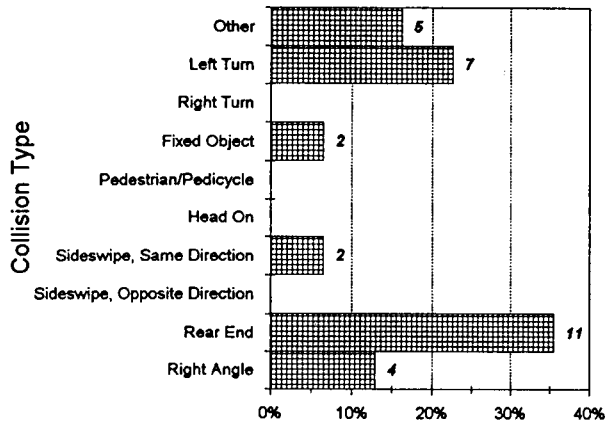
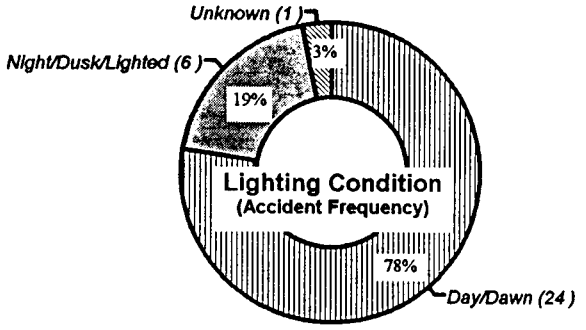
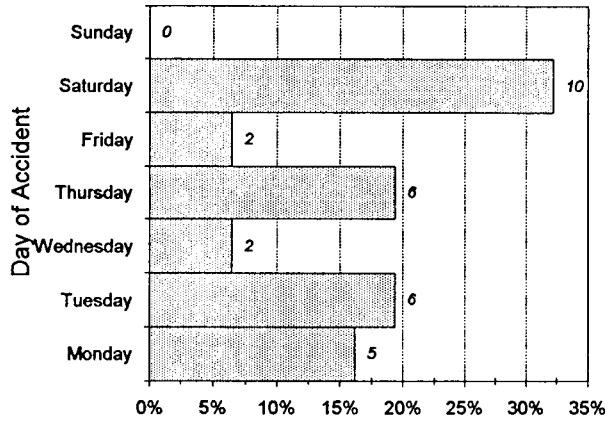


Figure 5.1.2 Accident Frequency By Collision Type
And Under Various Conditions







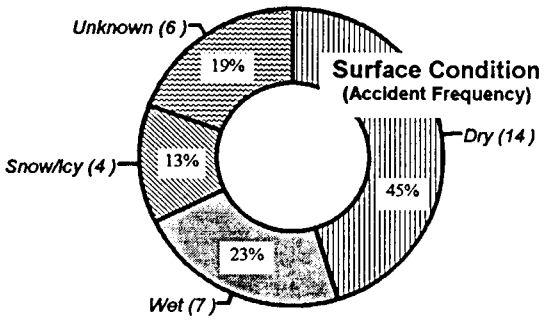


Table 5.1.1 Kimberly Rd. & Eastern Ave., Davenport

	1989	1990	1991	1992	1993
Total Accidents	20	21	27	23	31
# of Accidents with Fatality	0	0	0	0	0
# of Accidents with Injury	12	8	9	11	13
Accident Rate	1.50	1.20	1.54	1.32	1.78
Predominant Accident Type	Rear End	Rear End	Rear End	Rear End	Rear End

5.2 Iowa Location #2 - Welcome Way(U.S. 61 SB) & U.S. 6/Kimberly Rd., Davenport

Ranked second, this location experienced thirty-one (31) accidents in 1993. Thirteen (13) of which resulted in fifteen (15) injured persons. Taking into account the traffic volume, the accident rate for this intersection was below the average for all top locations at 1.71 accidents per MEV. Right-angle crashes were the predominant accident type occurred between west bound traffic on Kimberly and south bound traffic on Welcome Way as shown in Figure 5.2.1. Over seventy percent (71%) of the accidents happened during daylight hours (See Figure 5.2.2).

Welcome Way (U.S. 61 SB) is a one-way major arterial with posted speed limit of 45 mph to the north and 35 mph to the south of the intersection. Kimberly Road (U.S. 6) is a six-lane divided major arterial with a posted speed limit of 35 mph at this location. Dual left-turn lanes were provided for west bound traffic turning south. Dual right-turn lanes and a single left-turn lane are provided for south bound traffic on Welcome Way. Traffic going south on Welcome Way must negotiate a sharp curve immediately after entering the southern leg.

Table 5.2.1 recounts the accident history of this intersection for the past five years. It has made to the top ten list for at least the past five years.

Figure 5.2.1 Iowa Location # 2
U.S.61 SB/Welcome Way & U.S.6/Kimberly Rd., Davenport

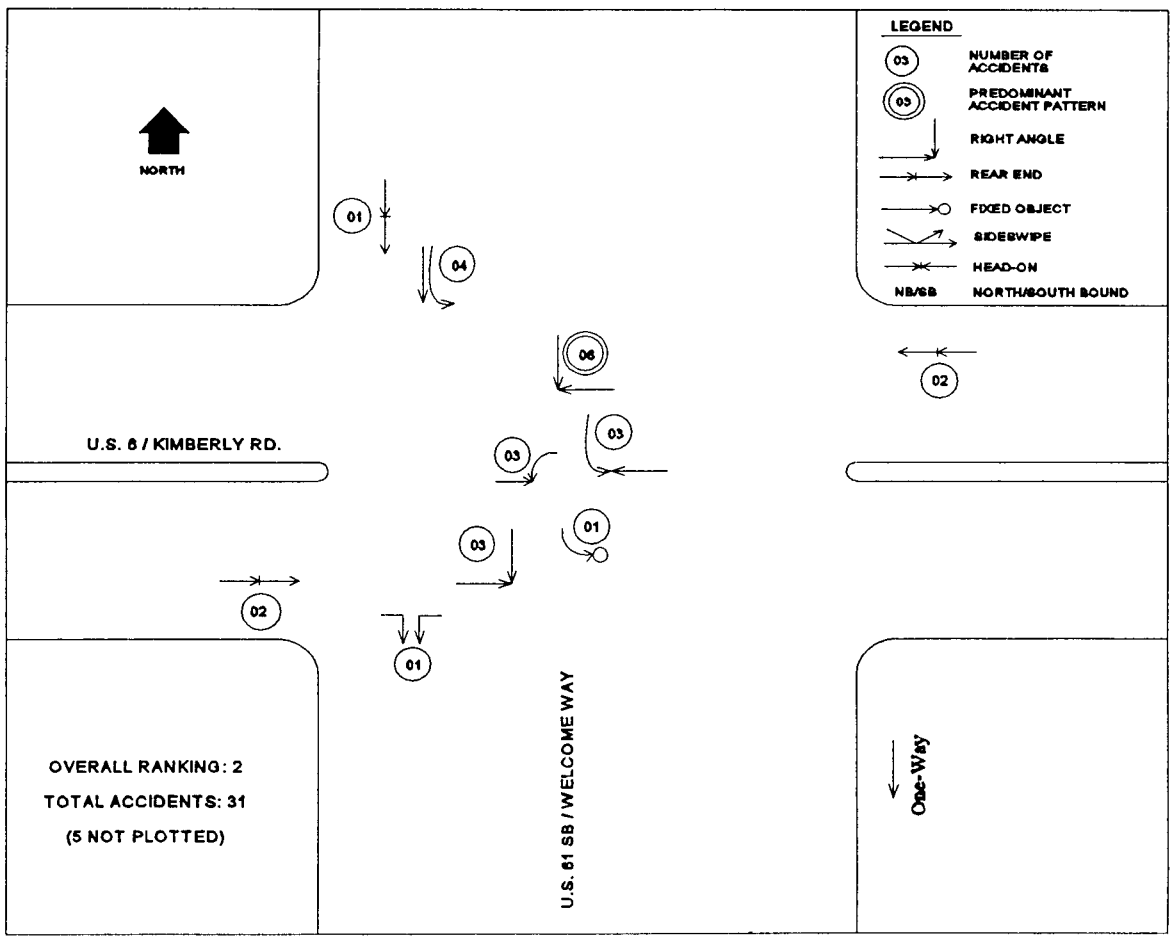
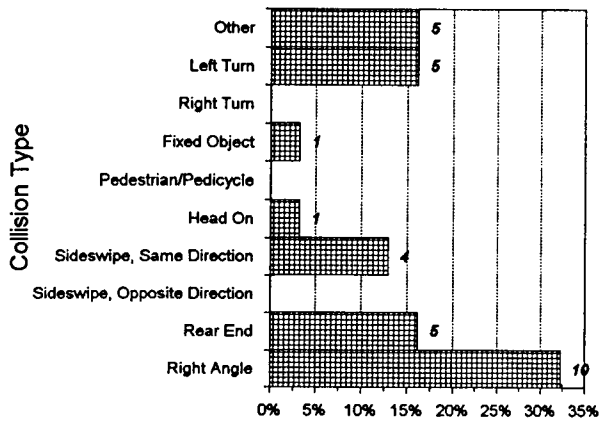
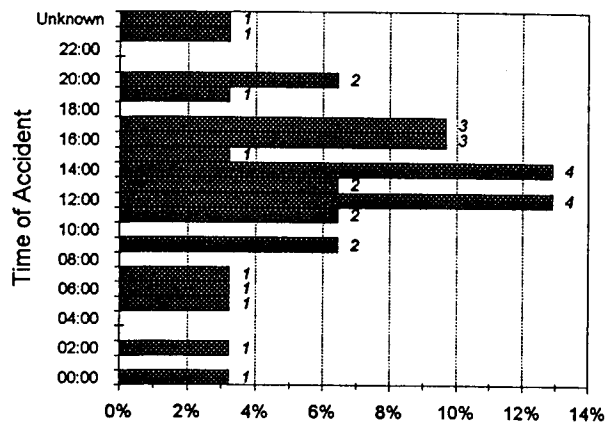
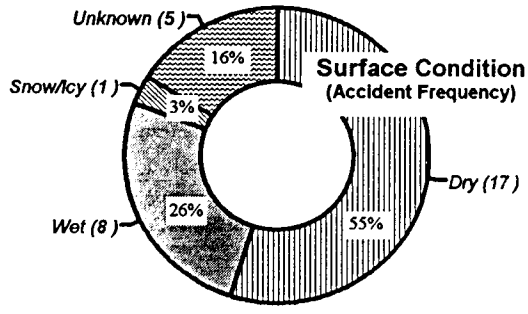


Figure 5.2.2 Accident Frequency By Collision Type
And Under Various Conditions







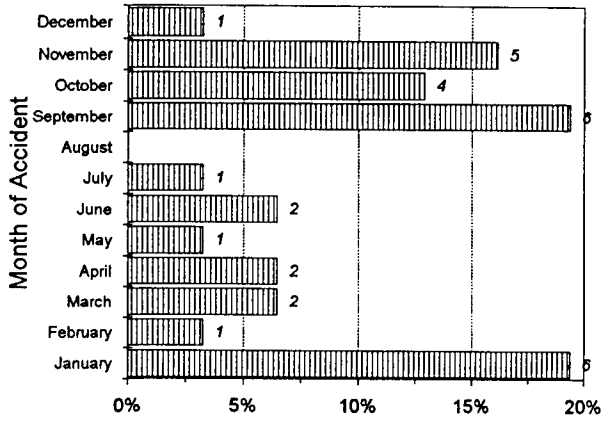


Table 5.2.1 Kimberly Rd. & US 61/Welcome Way, Davenport

	1989	1990	1991	1992	1993
Total Accidents	23	28	25	35	31
# of Accidents with Fatality	0	0	0	0	0
# of Accidents with Injury	5	8	7	7	13
Accident Rate	1.95	1.54	1.37	1.93	1.71
Predominant Accident Type	Right Angle	Right Angle	Rear End	Right Angle	Rear End

5.3 Iowa Location #3 - Third St. & Main St., Davenport

Ranked third, this location experienced twenty-one (21) accidents in 1993. Four (4) of which resulted in eight (8) injured persons. Taking into account the traffic volume, the accident rate for this intersection was well above the average for all top locations at 4.39 accidents per MEV. Right-angle crashes were the predominant accident type. They occurred between east bound traffic on Third Street and south bound traffic on Main Street as shown in Figure 5.3.1. Over eighty percent (86%) of the accidents happened during daylight and three quarters of the accidents happened when road surface was dry (See Figure 5.3.2).

Third Street is a four-lane one-way arterial going east through downtown Davenport. It allowed parking on the north side of the street. Main Street is a two-lane street with parking meters on both sides. Both streets are located in the Central Business District. The speed limit is not posted and therefore would be the legal 30 mph.

Table 5.3.1 recounts the accident history of this intersection for the past five years. The year 1993 marked a major increase of accidents at this location.

Figure 5.3.1 Iowa Location # 3
3rd St. & Main St., Davenport

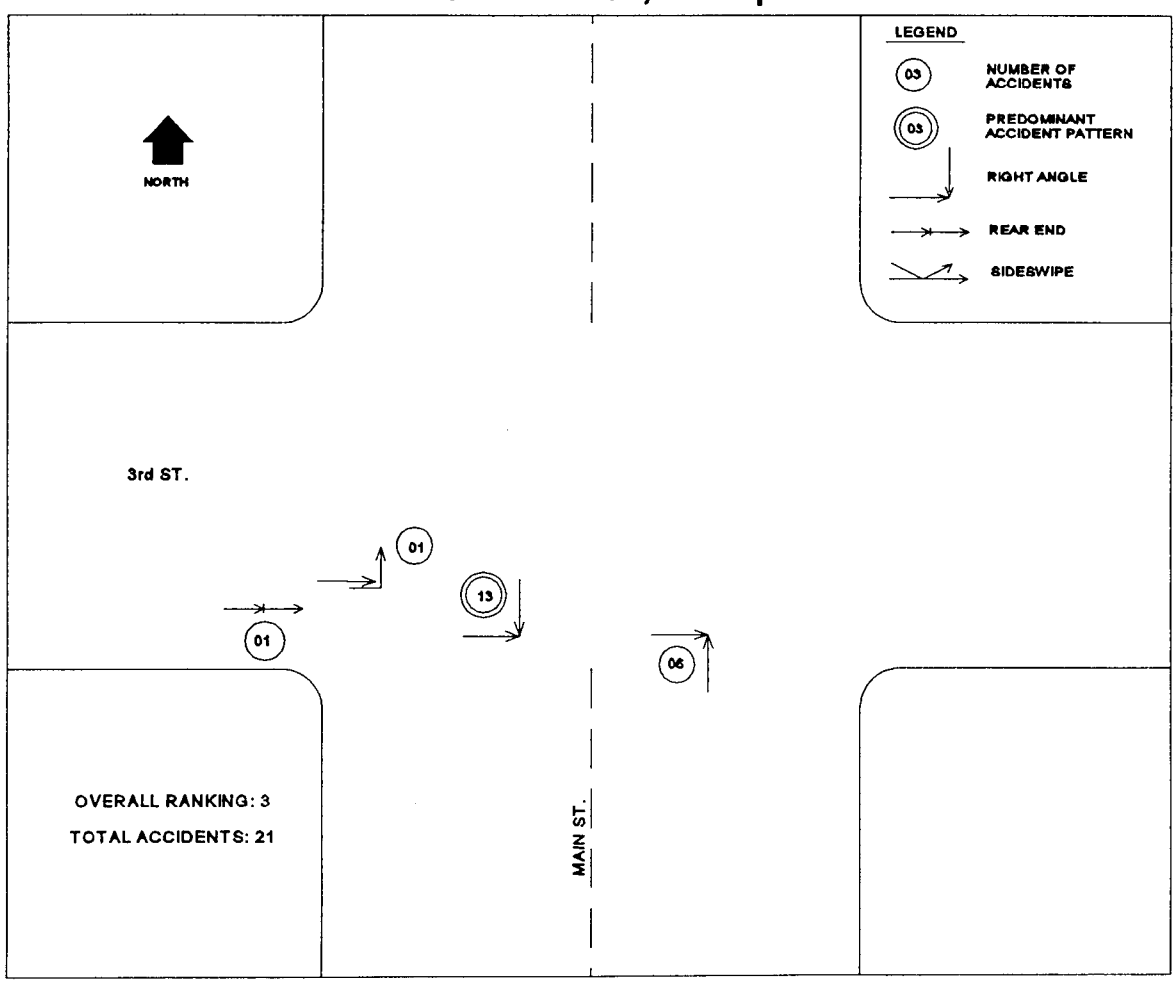
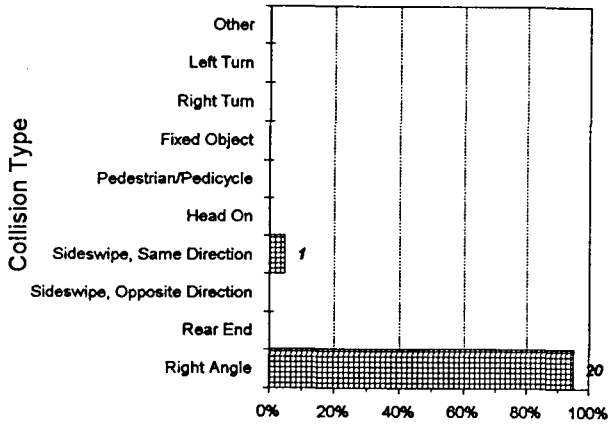
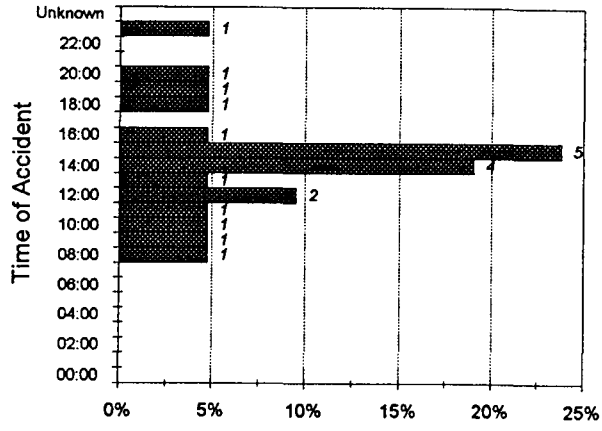
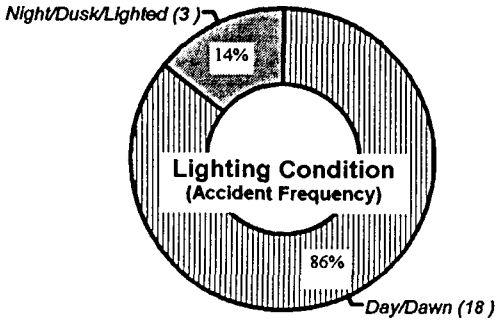


Figure 5.3.2 Accident Frequency By Collision Type
And Under Various Conditions







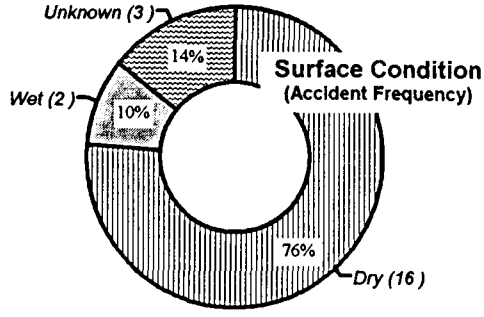


Table 5.3.1 Third St. & Main St., Davenport

	1989	1990	1991	1992	1993
Total Accidents	11	11	10	8	21
# of Accidents with Fatality	0	0	0	0	0
# of Accidents with Injury	5	3	3	4	4
Accident Rate	1.44	2.29	2.08	1.67	4.39
Predominant Accident Type	N/A	N/A	N/A	N/A	Right Angle

5.4 Iowa Location #4 - U.S. 61/State St. & Devil's Glen Rd., Bettendorf

Ranked a tie with Location #3, this location experienced twenty-four (24) accidents in 1993. Eight (8) of which resulted in twelve (12) injured persons. Taking into account the traffic volume, the accident rate for this intersection was above the average for all top locations at 2.92 accidents per MEV. Right-angle crashes were the predominant accident type. They occurred between west bound traffic on State Street and south bound traffic turning right on Devil's Glen Road as shown in Figure 5.4.1. Nearly half (46%) of the accidents happened when the road surface was wet, snowy or icy (See Figure 5.4.2).

State Street is an undivided four-lane U.S. route with a posted speed limit of 45 mph. Devil's Glen Road is a two-lane arterial with a right-turn only lane on the northern leg. The southern leg has no markings and no curbs. There is extensive industrial development along State Street. This was reflected in the type of vehicles involved in the accidents as more than half were trucks. Further this may explain the absence of accidents on Sundays and at night as exhibited in Figure 5.4.2.

Table 5.4.1 recounts the accident history of this intersection for the past five years. The year 1993 marked a major increase in accidents at this location.

Figure 5.4.1 Iowa Location # 4
U.S. 67/State St. & Devil's Glen Rd., Bettendorf

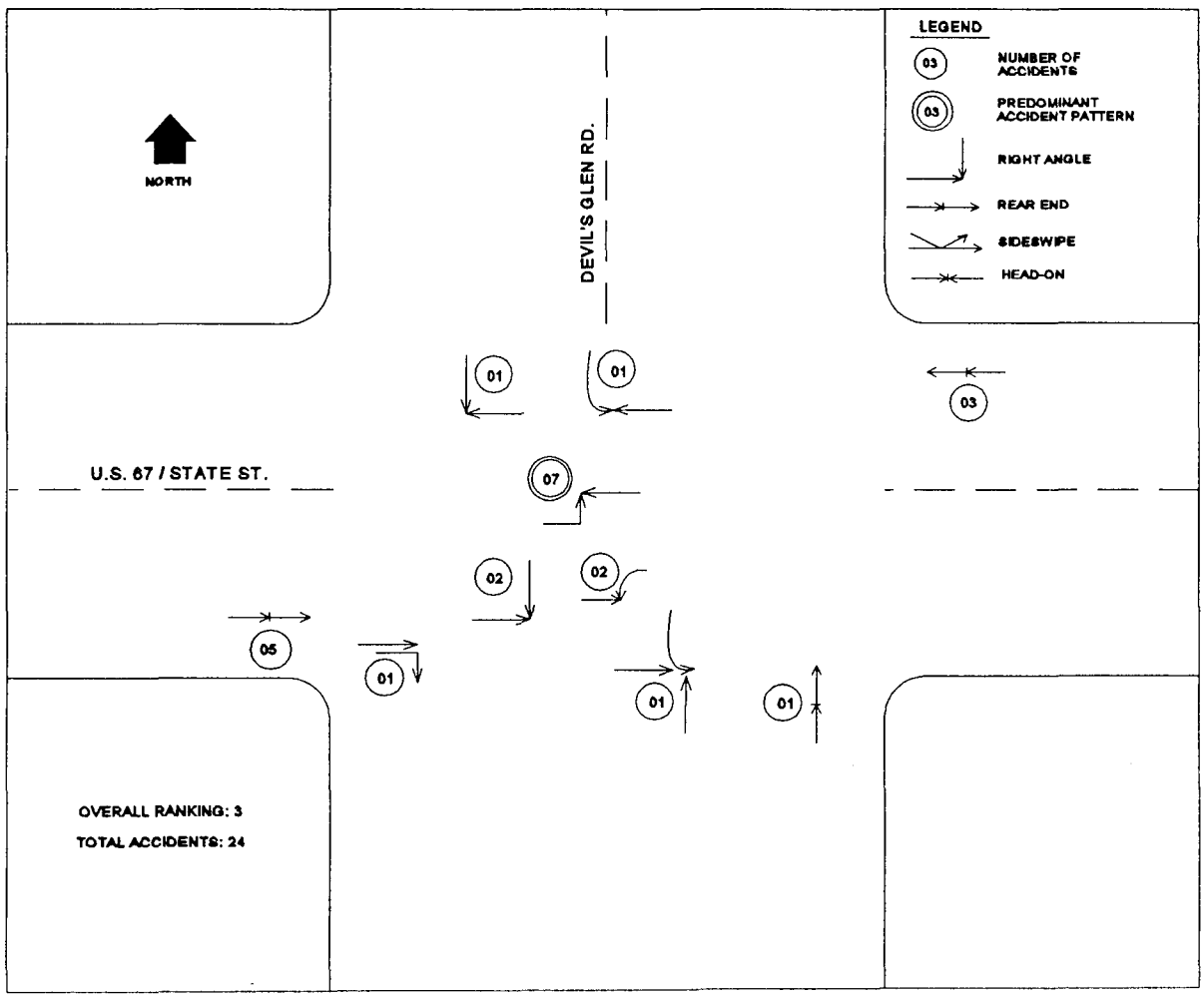
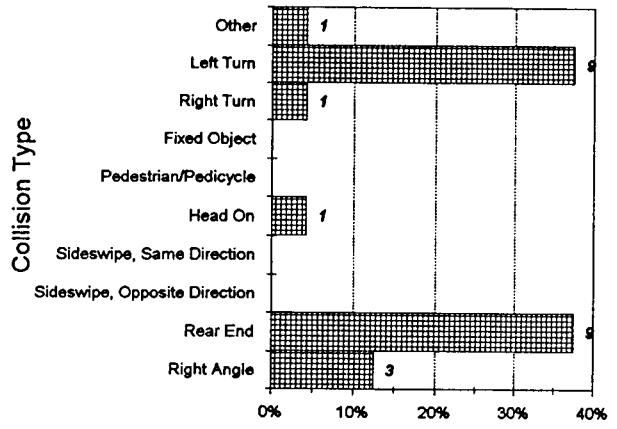
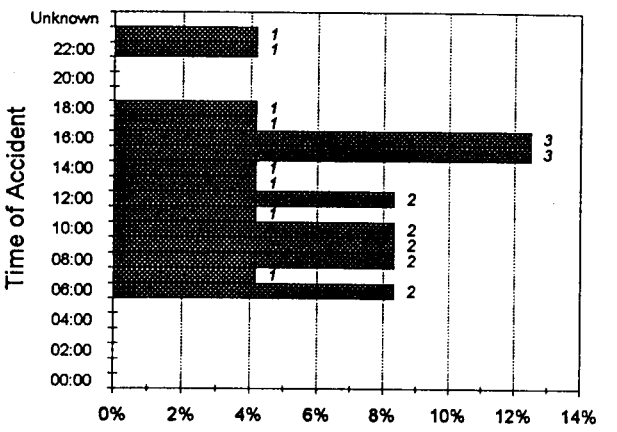
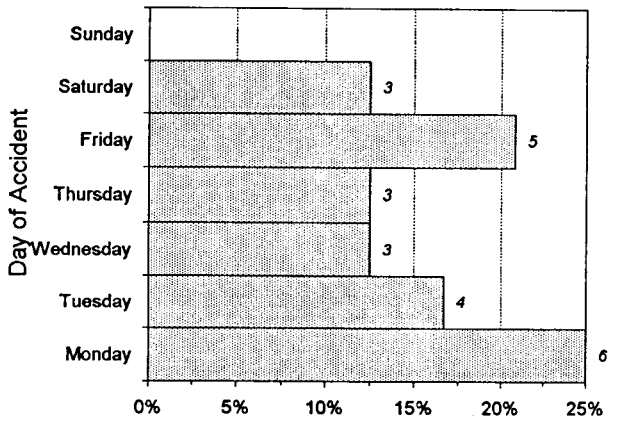


Figure 5.4.2 Accident Frequency By Collision Type
And Under Various Conditions







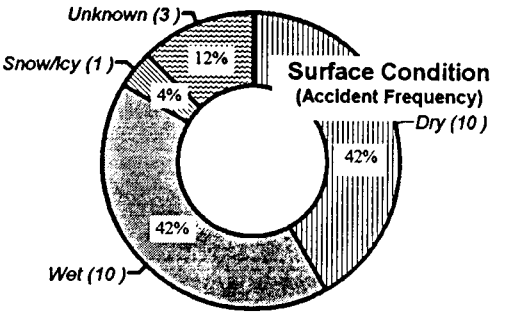


Table 5.4.1 State St./US 61 & Devil's Glen Rd., Bettendorf

	1989	1990	1991	1992	1993
Total Accidents	6	9	16	15	24
# of Accidents with Fatality	0	0	0	0	0
# of Accidents with Injury	3	4	5	6	8
Accident Rate	0.85	1.09	1.97	1.83	2.92
Predominant Accident Type	N/A	N/A	N/A	N/A	Left Turn

5.5 Iowa Location #5 - Locust St., Division St., & Hickory Grove Rd., Davenport

Ranked fifth, this unique five-way intersection experienced twenty-three (23) accidents in 1993. Ten (10) of which resulted in twelve (12) injured persons. Taking into account the traffic volume, the accident rate for this intersection was just below the average for all top locations at 2.36 accidents per MEV. Rear-end crollisions were the predominant accident type. They occurred among west bound traffic on Locust Street as shown in Figure 5.5.1. Figure 5.5.2 shows the types of accidents and the condition under which they occurred.

Locust Street and Division Street are both four-lane major arterials going east-west and north-south, respectively. They traverse the entire length of the city. Left-turn lanes are provided on the approaches of these two streets. Hickory Grove Road begins at this intersection and goes northwest diagonally with four lanes provided at this intersection. Speed limits posted are 35 mph except the east leg (Locust Street) that lowers to 25 mph. Every street corner of this intersection has business establishments. Their driveways are in close proximity to the junction. The buildings limit the sight distance of vehicles approaching the intersection.

Table 5.5.1 recounts the accident history of this intersection for the past five years. The year 1993 marked the third consecutive year that rear-end collisions were the predominant accident type.

Figure 5.5.1 Iowa Location # 5
Locust St., Division St. & Hickory Grove Rd., Davenport

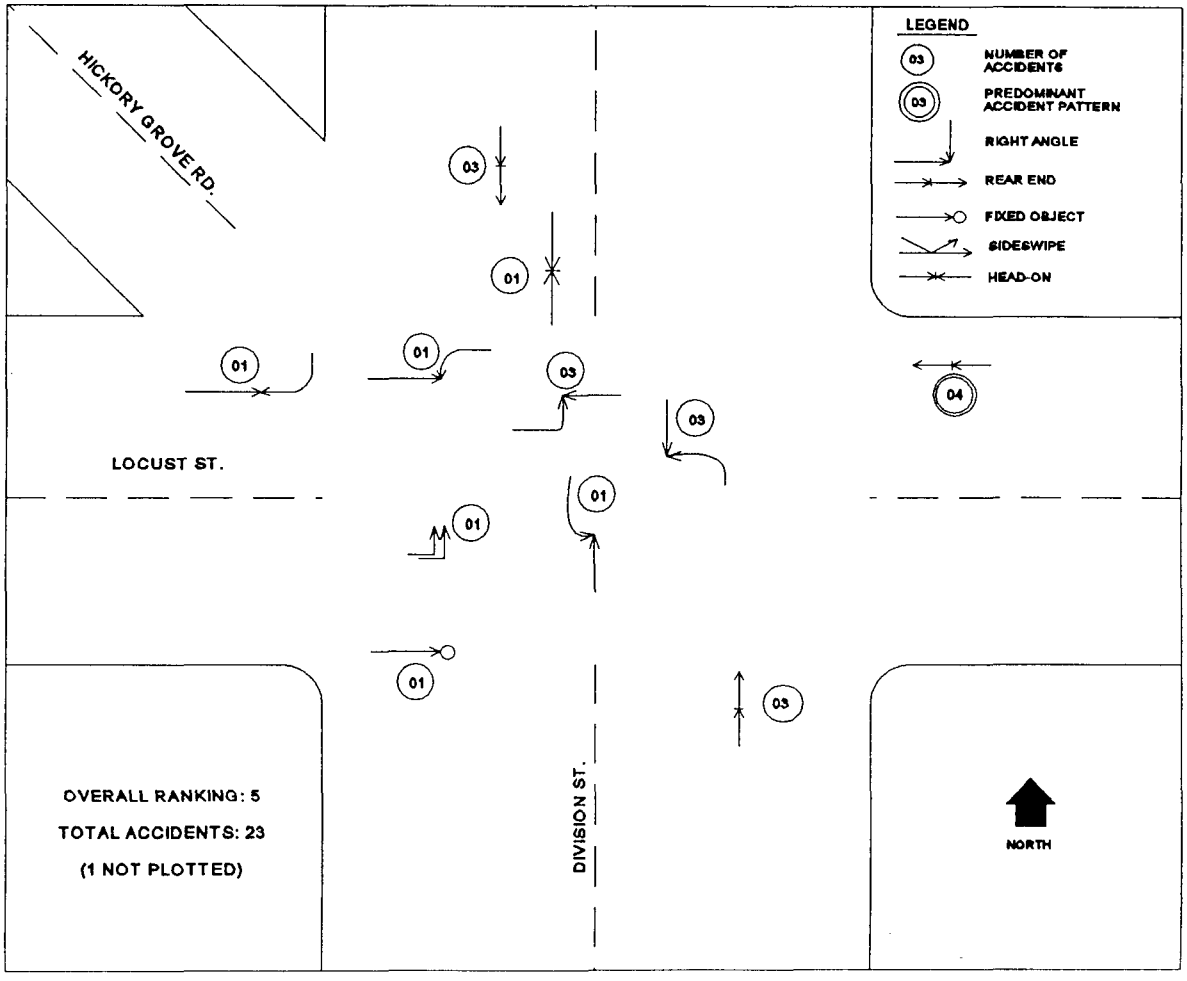
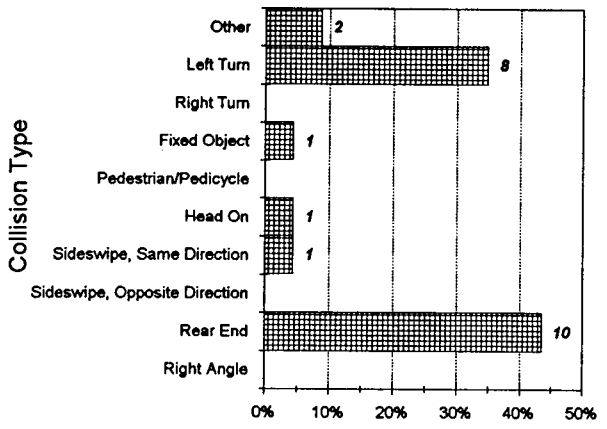
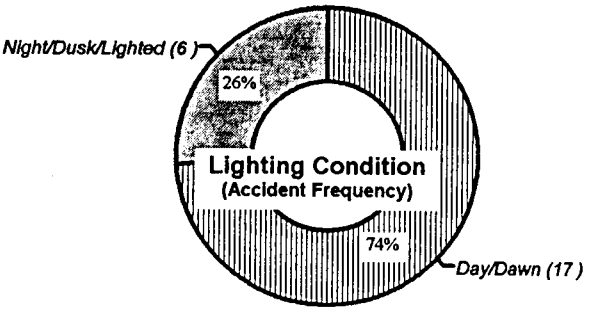
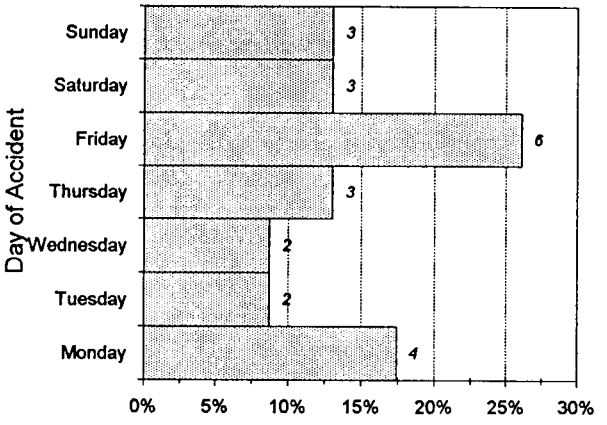


Figure 5.5.2 Accident Frequency By Collision Type
And Under Various Conditions







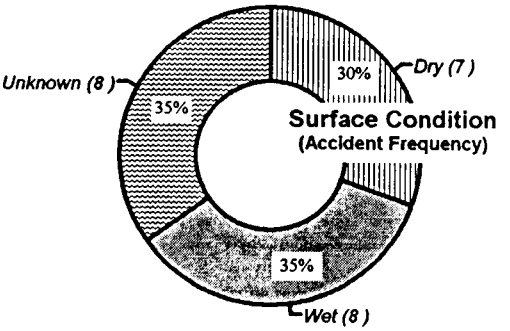


Table 5.5.1 Locust St, Division St & Hickory Grove Rd., Davenport

	1989	1990	1991	1992	1993
Total Accidents	11	33	21	26	23
# of Accidents with Fatality	0	0	0	0	0
# of Accidents with Injury	4	7	4	11	10
Accident Rate	0.97	2.86	2.15	2.67	2.36
Predominant Accident Type	Left Turn	N/A	Rear End	Rear End	Rear End

5.6 Iowa Location #6 - Marquette St. & Kimberly Rd., Davenport

Ranked sixth, this location experienced twenty-three (23) accidents in 1993. Eight (8) of which resulted in ten (10) injured persons. Taking into account the traffic volume, the accident rate for this intersection was below average for all top locations at 1.86 accidents per MEV. Rear-end crashes were the predominant accident type. They occurred among west bound traffic and among east bound traffic on Kimberly Road as shown in Figure 5.6.1.

Marquette Street is an undivided four-lane street with a posted speed limit of 35 mph. The southern approach of this road designates a right-turn only lane and a shared through and left-turn lane. Kimberly Road is a four-lane U.S. Route and a major arterial with left-turn only lanes at both east and west approaches. There is a major retailer and a medical center at this location. Kimberly Road reaches a low point here, topographically concave, which creates up slopes both to the east and west. Weekdays exhibited more accident occurrences than weekends (see Figure 5.6.2).

Table 5.6.1 recounts the accident history of this intersection for the past five years. The year 1993 marked the fifth consecutive year with an increase of total accidents.

Figure 5.6.1 Iowa Location # 6
Marquette St. & U.S.6/Kimberly Rd., Davenport

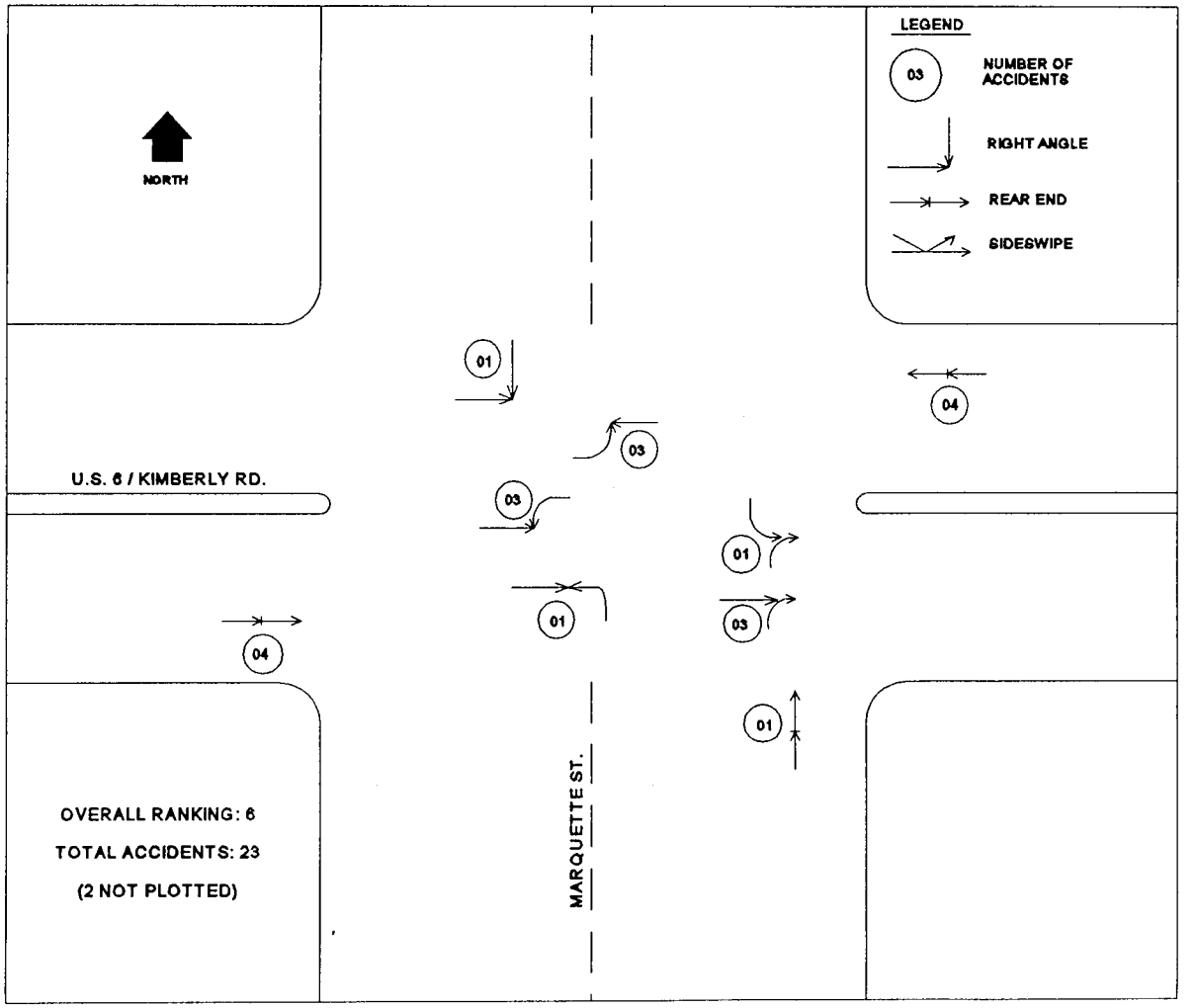
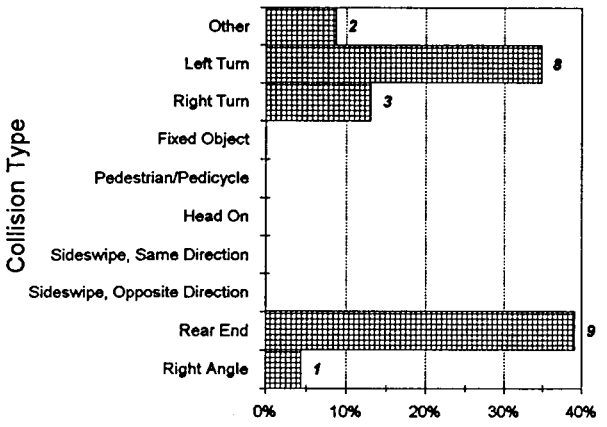
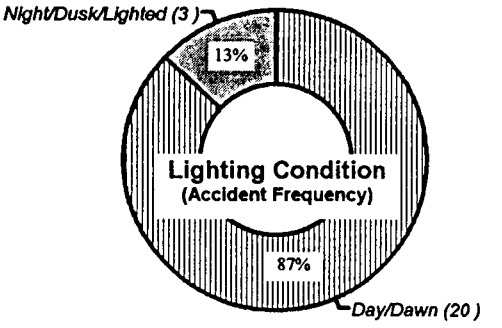
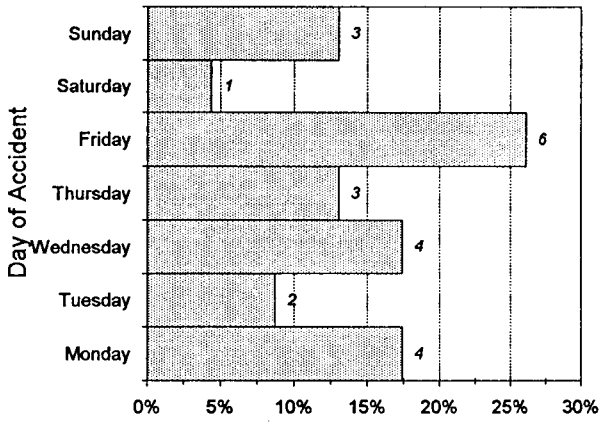


Figure 5.6.2 Accident Frequency By Collision Type
And Under Various Conditions







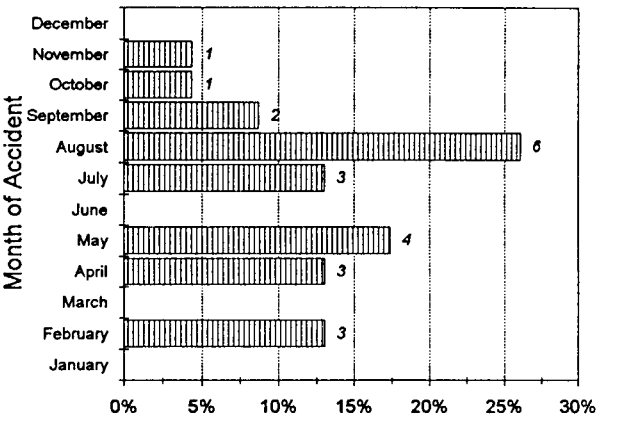


Table 5.6.1 Marquette St. & Kimberly Rd., Davenport

	1989	1990	1991	1992	1993
Total Accidents	7	9	16	18	23
# of Accidents with Fatality	0	0	0	0	0
# of Accidents with Injury	3	6	7	6	8
Accident Rate	0.69	0.72	1.29	1.46	1.86
Predominant Accident Type	N/A	N/A	N/A	N/A	Rear End

5.7 Iowa Location #7 - Marquette St. & 35th St., Davenport

Ranked seventh, this location experienced seventeen (17) accidents in 1993. Seven (7) of which resulted in eight (8) injured persons. Taking into account the traffic volume, the accident rate for this intersection was below average at 2.81 accidents per MEV. Left-turn crashes were the predominant accident type. They occurred between north bound through traffic and south bound left-turning traffic on Marquette Street as shown in Figure 5.7.1 and Figure 5.7.2.

Marquette Street and 35th Street are both undivided four-lane streets except for the western leg of 35th Street which has no visible pavement marking. Marquette Street has a speed limit posted of 35 mph. No turning lanes were marked for this location.

Table 5.7.1 recounts the accident history of this intersection for the past five years. The year 1993 was the first time this location entered top ten ranking.

Figure 5.7.1 Iowa Location # 7
35th St. & Marquette St., Davenport

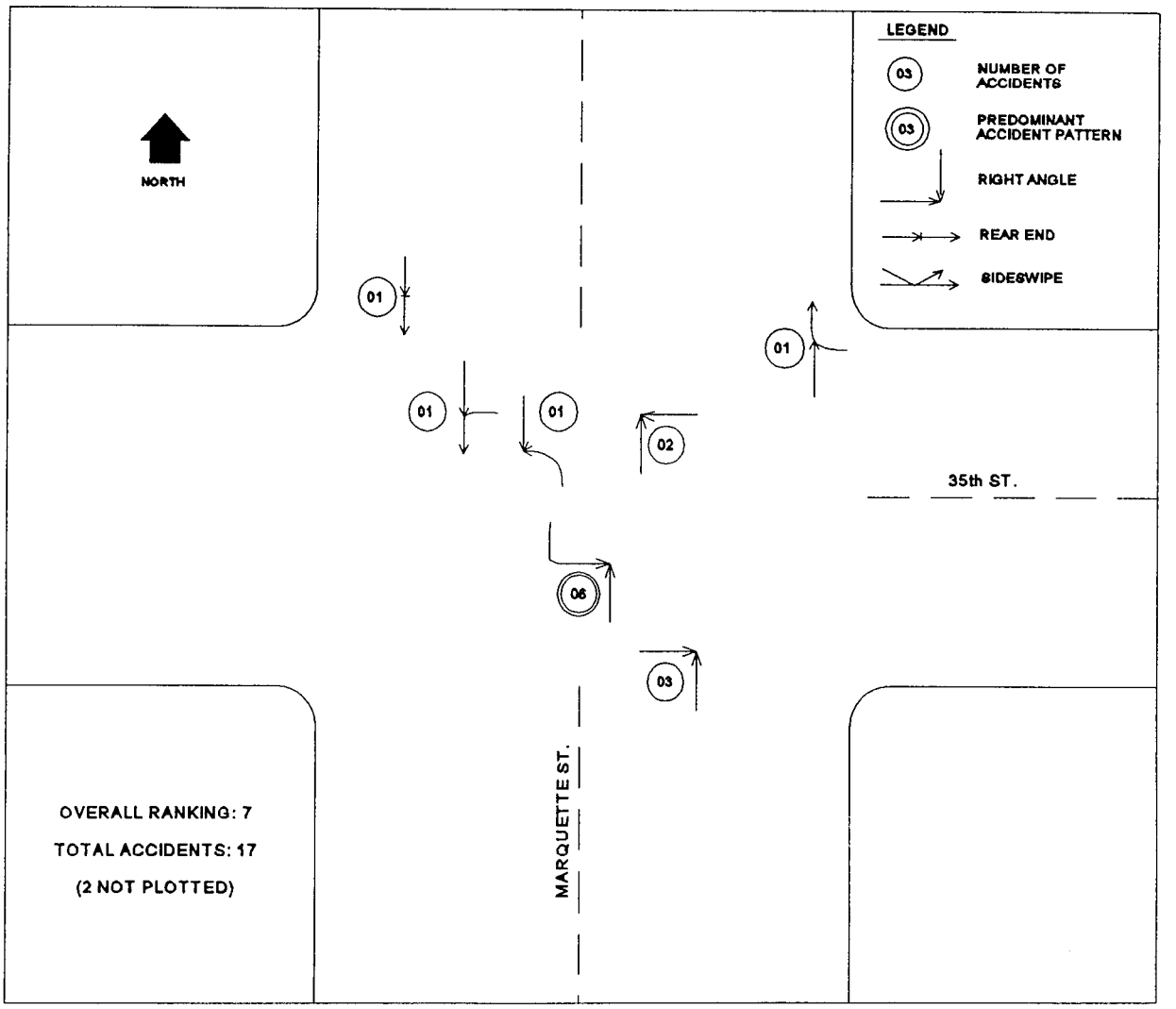
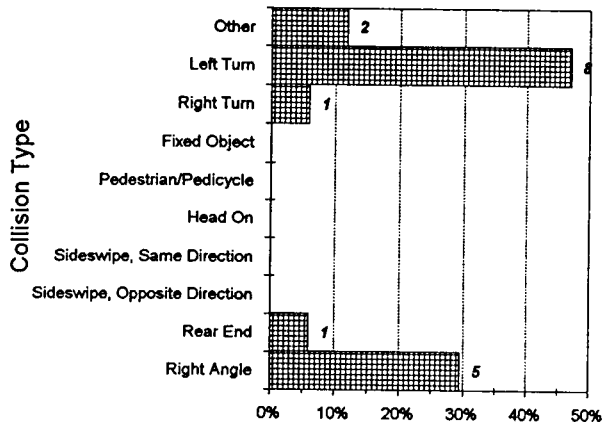
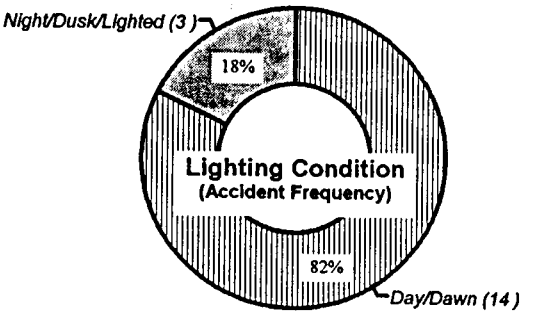
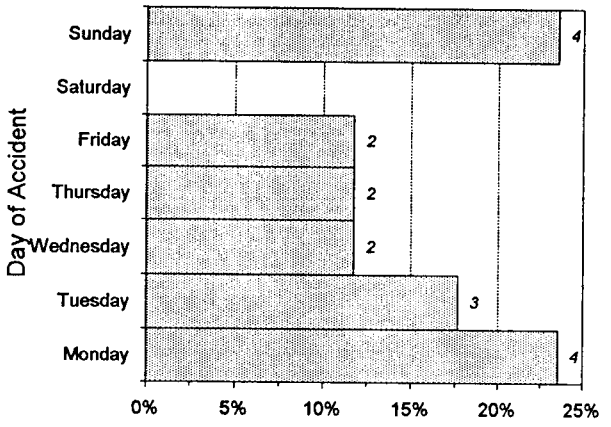


Figure 5.7.2 Accident Frequency By Collision Type
And Under Various Conditions







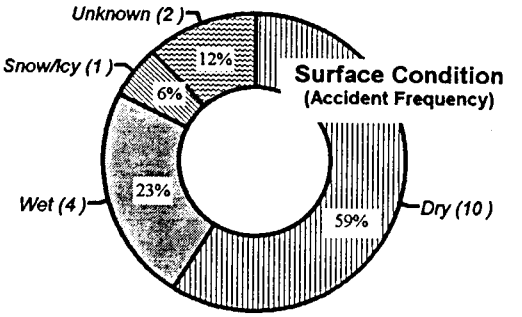


Table 5.7.1 Marquette St. & 35th St., Davenport

	1989	1990	1991	1992	1993
Total Accidents	10	13	20	13	17
# of Accidents with Fatality	0	0	0	0	0
# of Accidents with Injury	4	8	6	7	7
Accident Rate	1.81	2.14	3.29	2.14	2.81
Predominant Accident Type	N/A	N/A	N/A	N/A	Left Turn

5.8 Iowa Location #8 - 53rd St. & U.S. 61 NB/Brady St., Davenport

Ranked at tie with location #7, this intersection experienced twenty-one (21) accidents in 1993. Eleven (11) of which resulted in thirteen (13) injured persons. Taking into account the traffic volume, the accident rate for this intersection was below average at 1.59 accidents per MEV. Rear-end crashes were the predominant accident type. They occurred among north bound traffic on Brady Street as shown in Figure 5.8.1.

Fifty-third Street is an undivided four-lane street with a posted speed limit of 35 mph. Brady Street is a four-lane one-way north bound major arterial with a speed limit of 45 mph. No left or right-turn only lanes are provided. The right turn channelization is next to the intersection without a right-turn pocket. Almost half (43%) of the accidents occurred when the pavement was wet, snowy or icy (see Figure 5.8.2).

Table 5.8.1 recounts the accident history of this intersection for the past five years. The year 1993 was the third time this location entered the top ten ranking.

Figure 5.8.1 Iowa Location # 8
53rd St. & U.S.61 NB/Brady St., Davenport

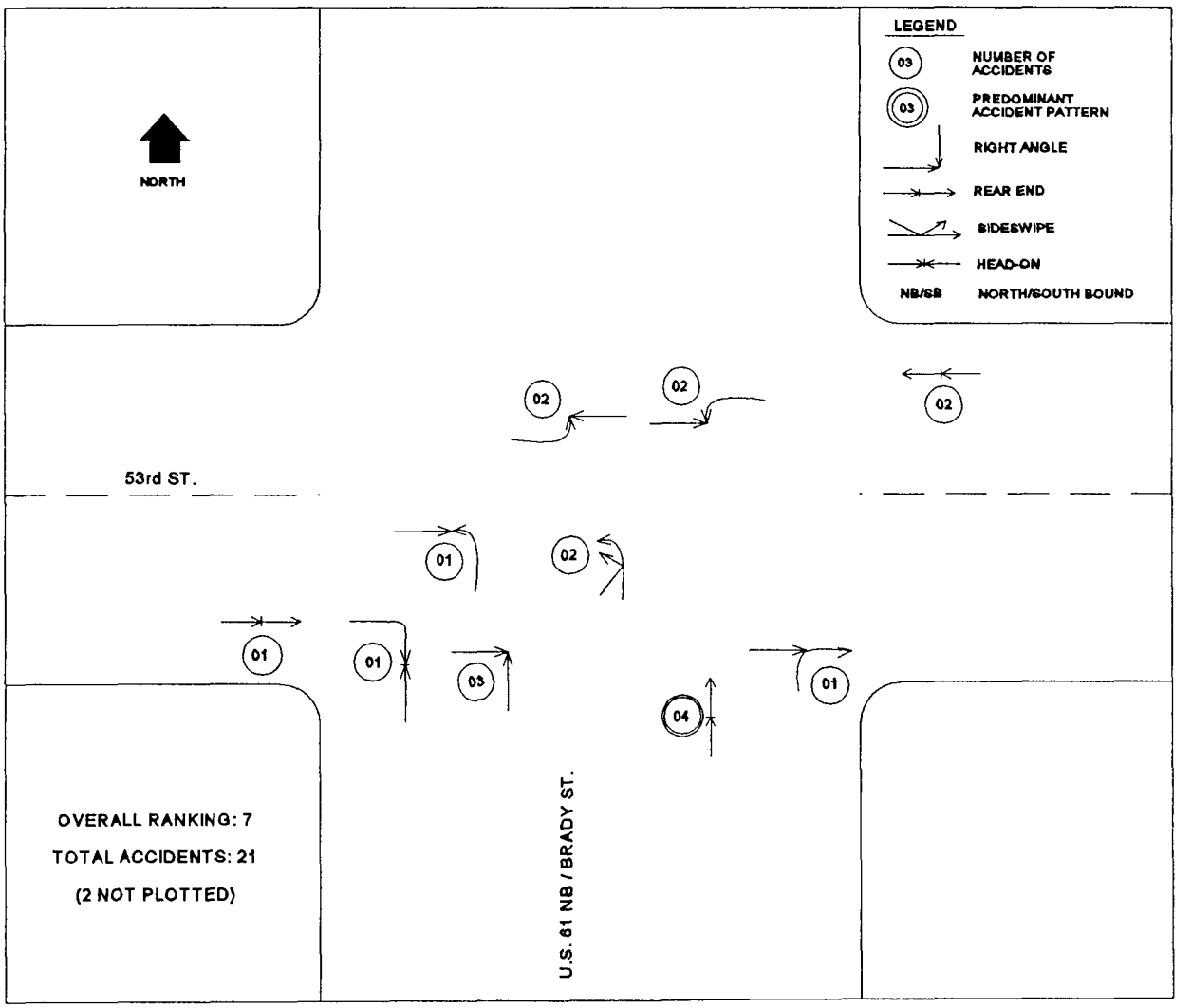
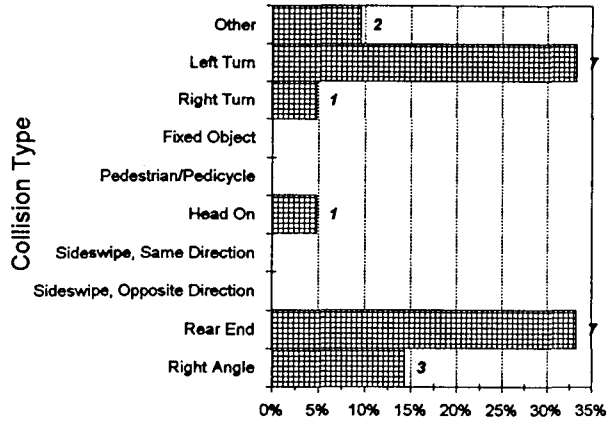
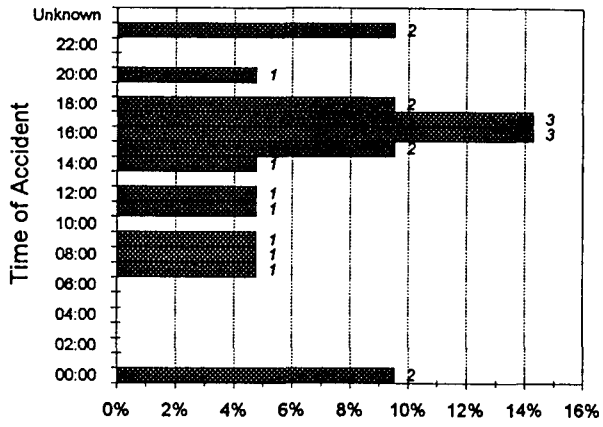
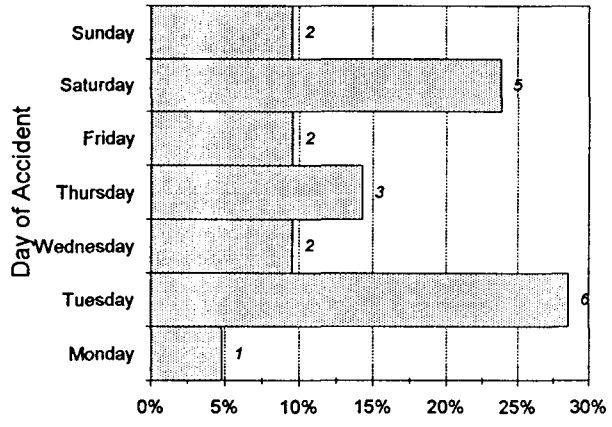


Figure 5.8.2 Accident Frequency By Collision Type
And Under Various Conditions







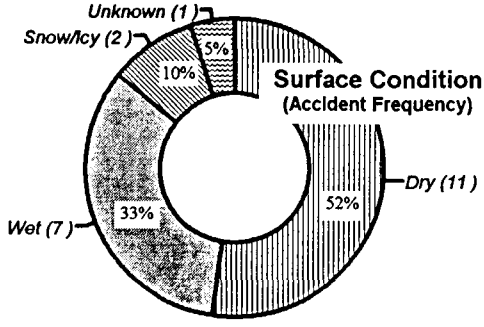


Table 5.8.1 53rd St. & US 61 NB/Brady St., Davenport

	1989	1990	1991	1992	1993
Total Accidents	13	12	23	15	21
# of Accidents with Fatality	0	0	0	0	0
# of Accidents with Injury	7	4	4	4	11
Accident Rate	1.11	1.19	1.74	1.14	1.59
Predominant Accident Type	N/A	Right Angle	Rear End	N/A	Rear End

5.9 Iowa Location #9 - Elmore Ave. & U.S. 6/Kimberly Rd., Davenport

Ranked ninth, this location experienced twenty-two (22) accidents. Eight (8) of which resulted in nine (9) injured persons. Taking into account the traffic volume, the accident rate for this intersection was below average at 1.32 accidents per MEV. Rear-end crashes were the predominant accident type occurring on the western and southern legs of Kimberly Road as shown in Figure 5.9.1.

Kimberly Road is a four-lane U.S. Route and a major arterial. It changes its general direction from east-west to north-south at this point. It provides dual left-turn lanes at both south and west approaches. Elmore Avenue is a four-lane road with several major retailers north of the intersection. The east approach of this intersection connects with an interchange of I-74. More frequent accidents on Saturdays, in December and during daylight hours may all correlate to the extensive shopping traffic in this area (see Figure 5.9.2).

Table 5.9.1 recounts the accident history of this intersection for the past five years. The year 1993 was the second time this location entered the top ten ranking.

Figure 5.9.1 Iowa Location # 9
Elmore Ave. & U.S.6/Kimberly Rd., Davenport

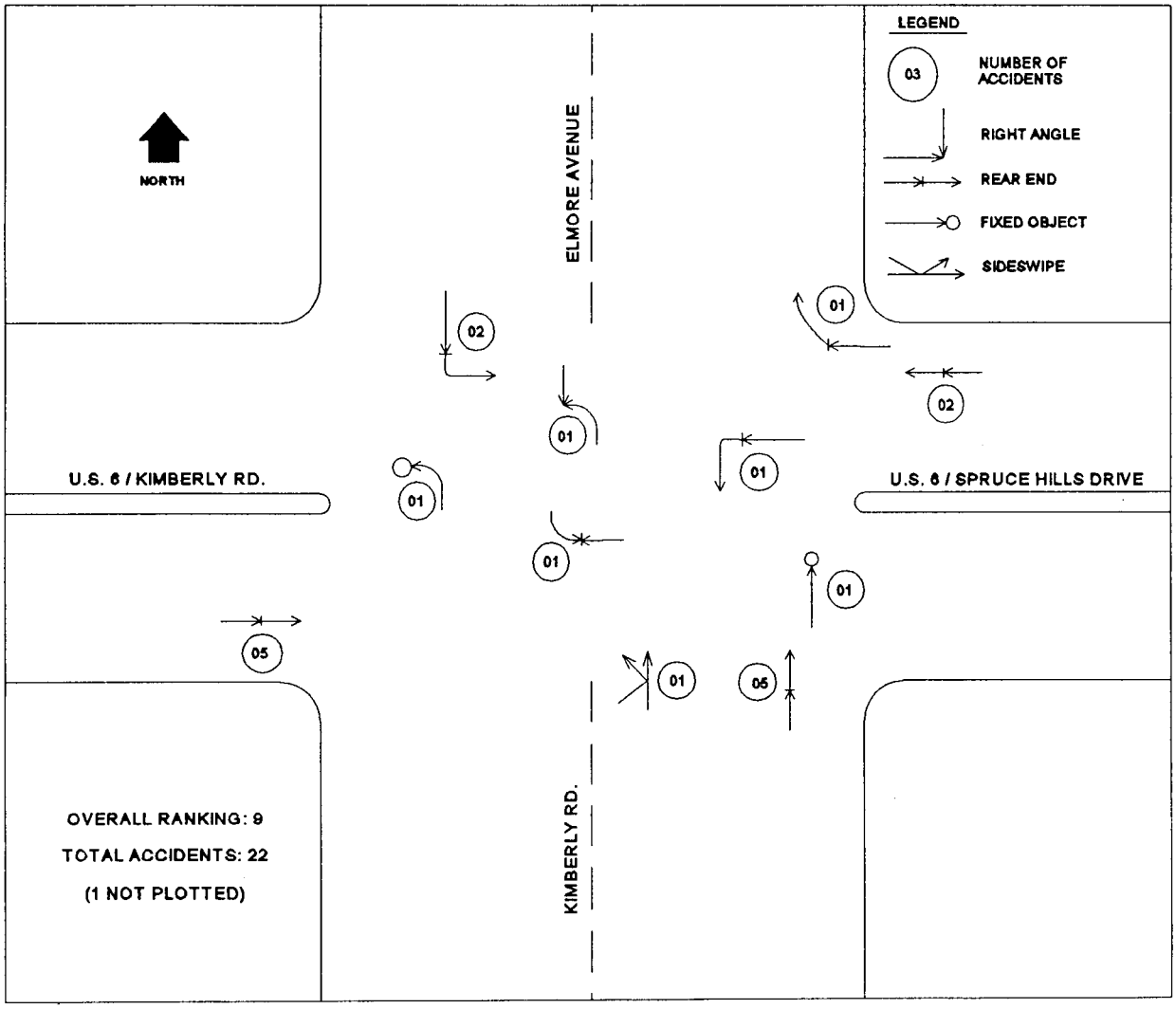
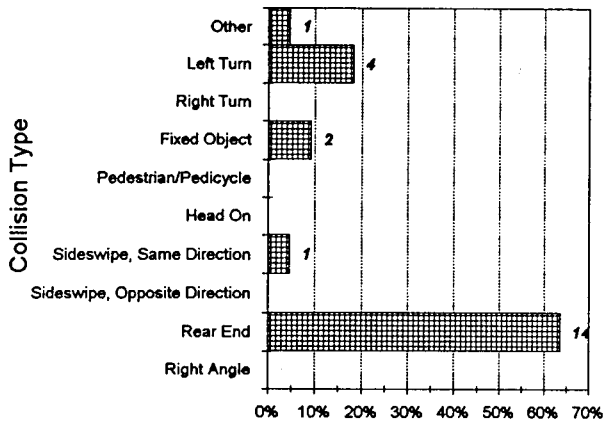
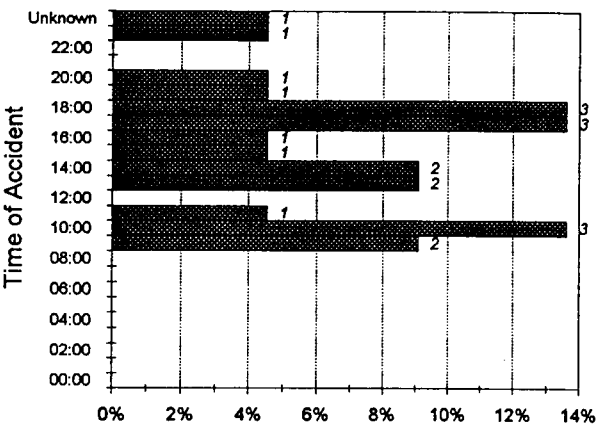
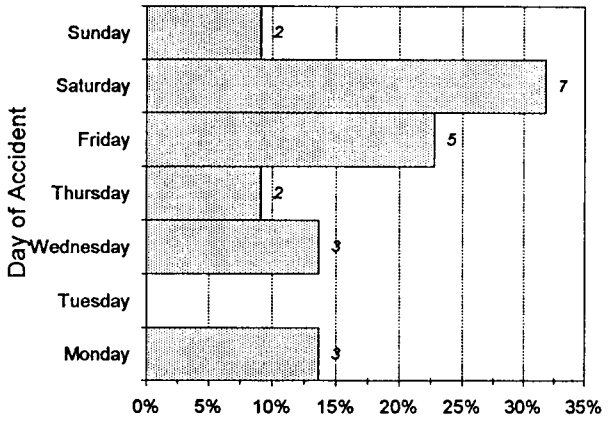


Figure 5.9.2 Accident Frequency By Collision Type
And Under Various Conditions







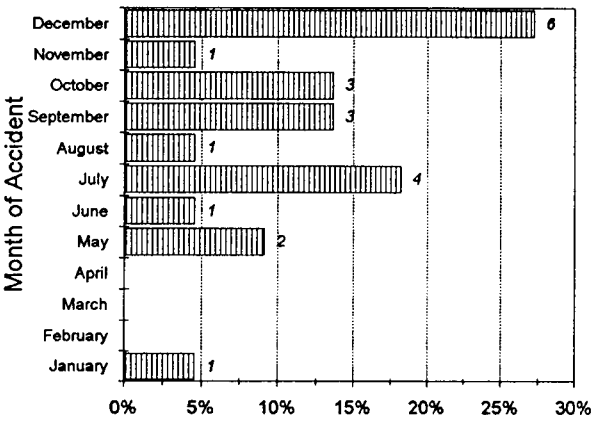


Table 5.9.1 Elmore Ave. & Kimberly Rd., Davenport

	1989	1990	1991	1992	1993
Total Accidents	18	14	19	22	22
# of Accidents with Fatality	0	0	0	0	0
# of Accidents with Injury	3	6	5	12	8
Accident Rate	1.45	0.83	1.13	1.32	1.32
Predominant Accident Type	N/A	N/A	N/A	Rear End	Rear End

5.10 Iowa Location #10 - Spring St. & U.S. 6/Kimberly Rd., Davenport

Ranked a tie with location #9, this location experienced twenty-two (22) accidents. Eight (8) of which resulted in twelve (12) injured persons. Taking into account the traffic volume, the accident rate for this intersection was below average at 1.31 accidents per MEV. Rear-end crashes were the predominant accident type. They occurred among the west bound traffic on Kimberly Road as shown in Figure 5.10.1.

Kimberly Road is a four-lane U.S. Route and a major arterial with a speed limit of 45 mph. It provides left-turn only lanes at both east and west approaches at this location. Spring Street is a two-lane road with a left-turn lane for the north approach only. The frequency of accidents under various conditions is shown in Figure 5.10.2.

Table 5.10.1 recounts the accident history of this intersection for the past five years. After two consecutive years off the top chart, this intersection again ranked among the ten highest intersections in Iowa.

Figure 5.10.1 Iowa Location # 10
Spring St. & U.S.6/Kimberly Rd., Davenport

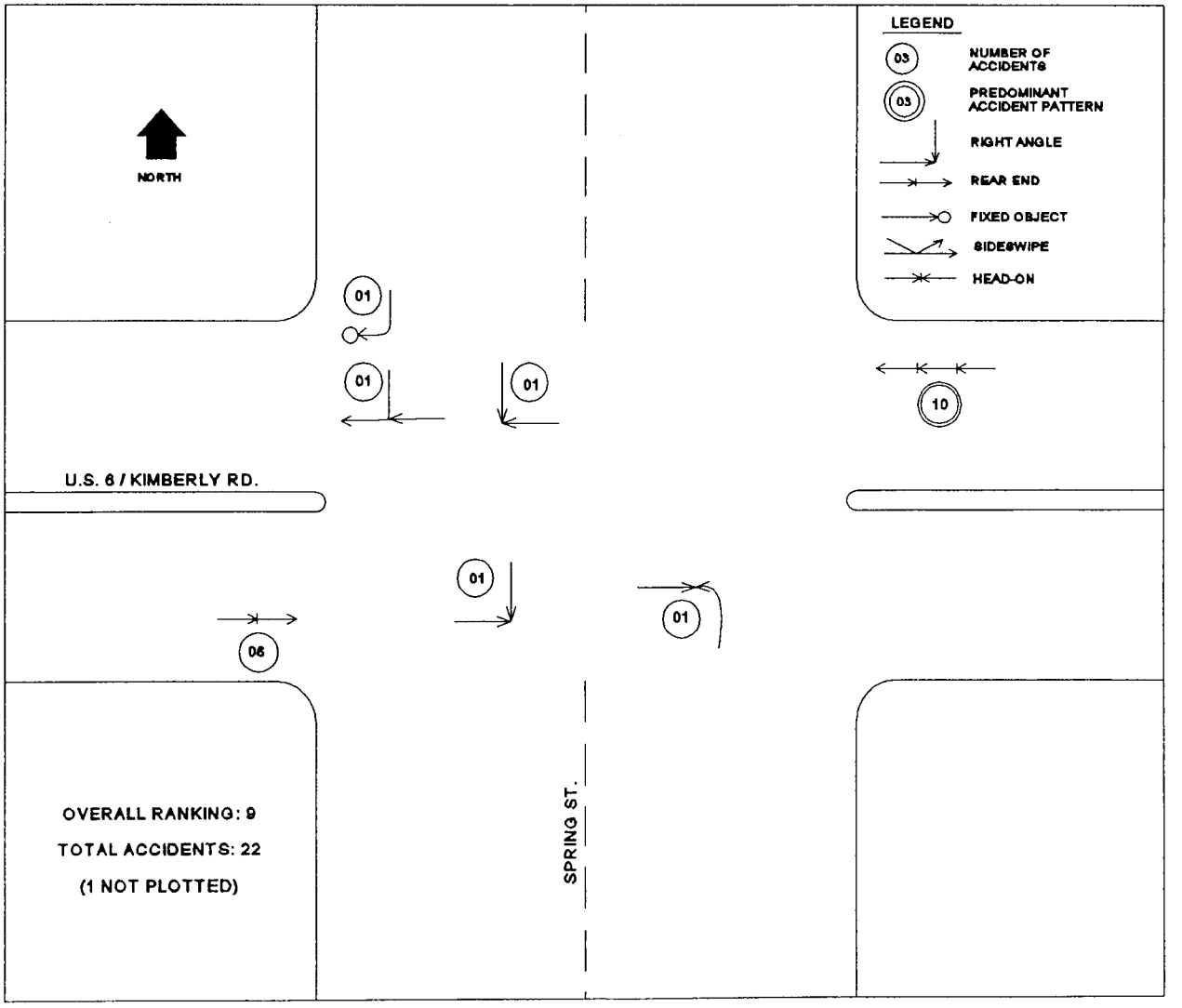
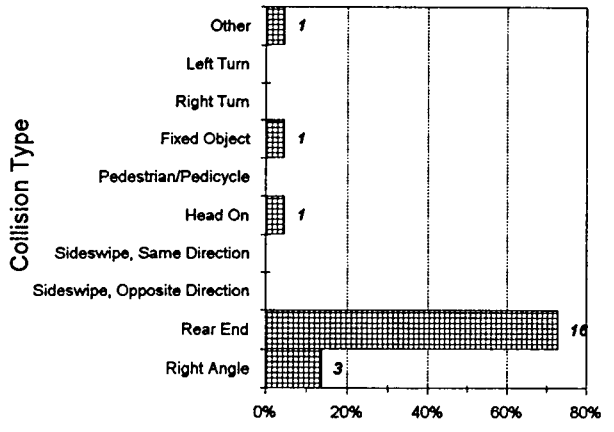
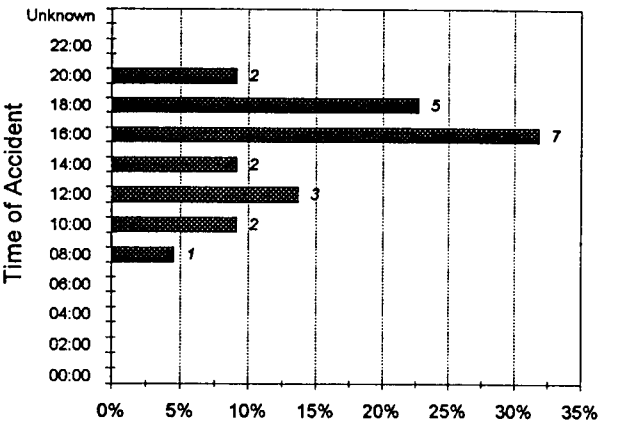
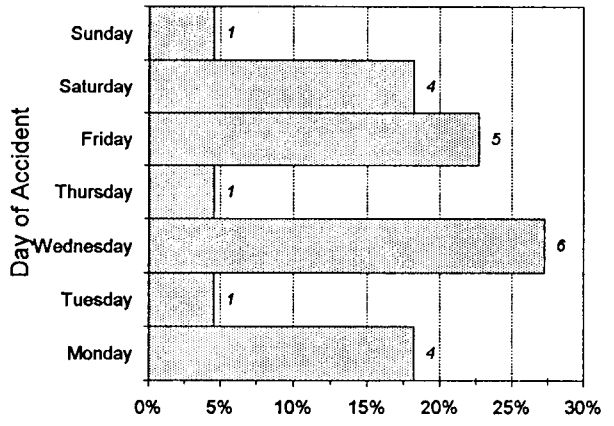


Figure 5.10.2 Accident Frequency By Collision Type
And Under Various Conditions







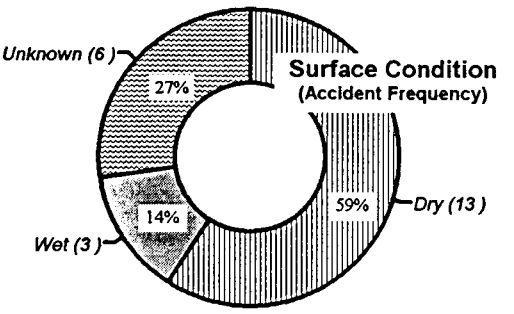


Table 5.10.1 Spring St. & Kimberly Rd., Davenport

	1989	1990	1991	1992	1993
Total Accidents	14	21	18	12	22
# of Accidents with Fatality	0	0	0	0	0
# of Accidents with Injury	3	9	9	7	8
Accident Rate	1.10	1.25	1.07	0.71	1.31
Predominant Accident Type	N/A	Left Turn	N/A	N/A	Rear End

5.11 Iowa Location #11 - Locust St. & Iowa St., Davenport

Ranked a tie with location 9 and 10, this location experienced eighteen (18) accidents. Seven (7) of which resulted in eleven (11) injured persons. Taking into account the traffic volume, the accident rate for this intersection was below average at 2.31 accidents per MEV. Figure 5.11.1 is the accident diagram of this location.

Locust Street is a four-lane major arterial with a speed limit of 25 mph at this location. Iowa Street is a two-lane collector. There is no visible lane markings on Iowa street. There are businesses buildings at both northwest and southwest corners. There is no set backs for these buildings other than the sidewalks. This obstructs the sight distance of traffic on Locust and Iowa street. There are businesses on the other two corners which have access driveways connecting to the roadways. Street lighting is limited to one light at the intersection. Frequency of accident under various conditions is shown in Figure 5.11.2.

Table 5.11.1 recounts the accident history of this intersection for the past five years.

Figure 5.11.1 Iowa Location # 11
Locust St. & Iowa St., Davenport

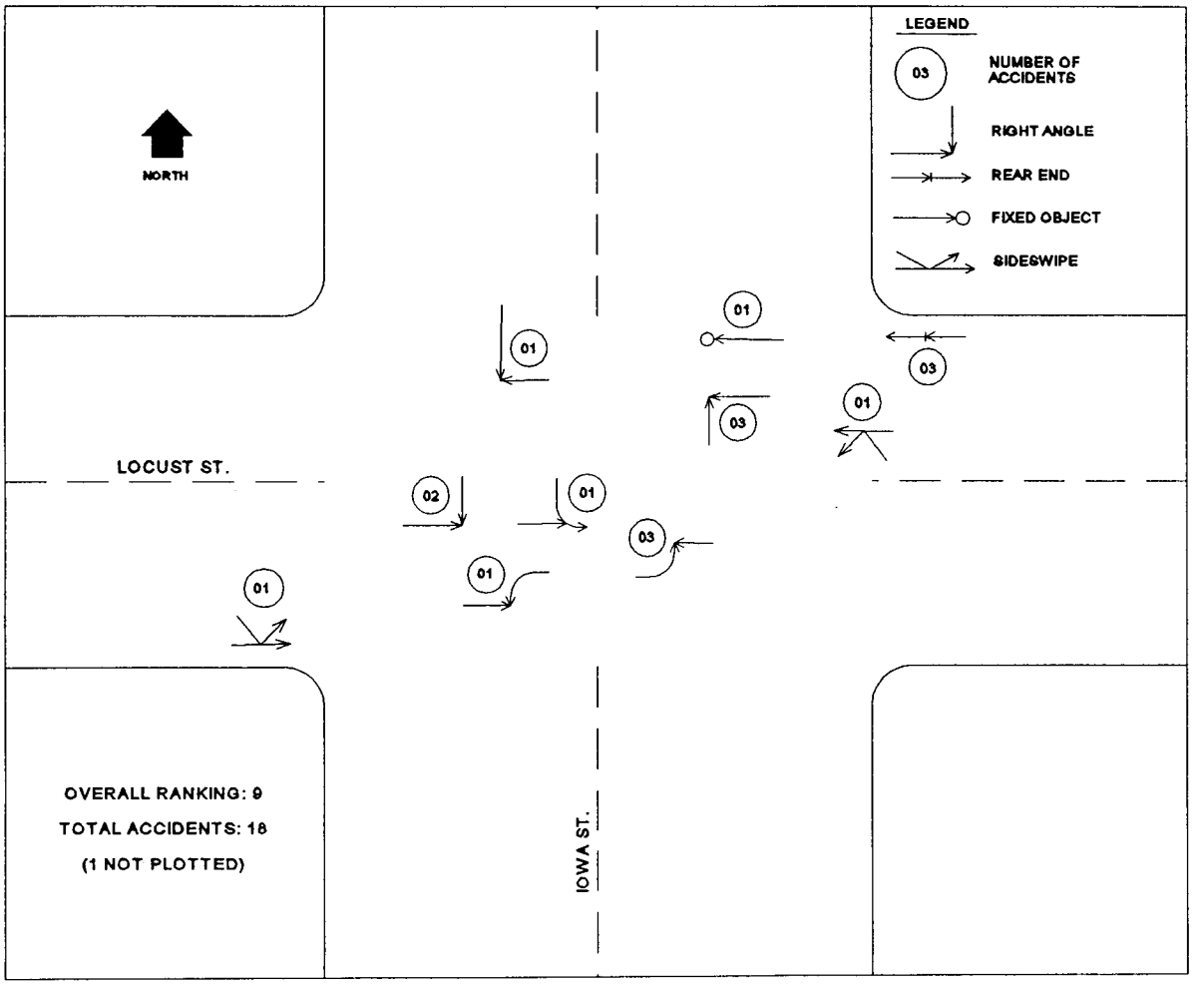
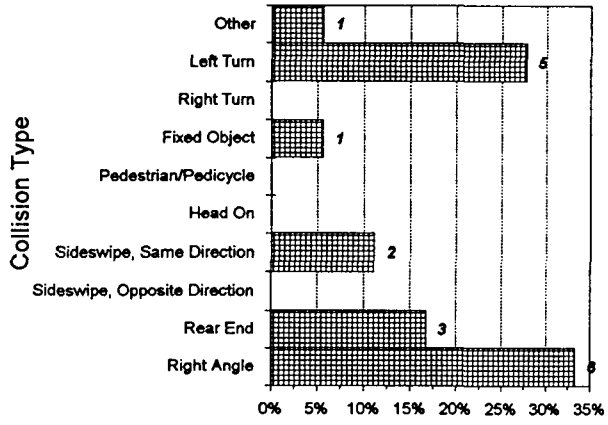
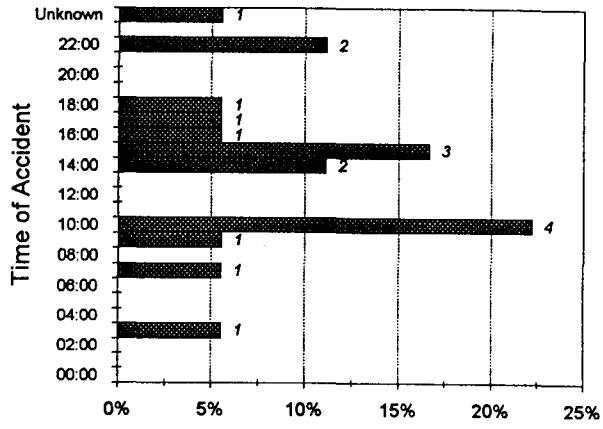
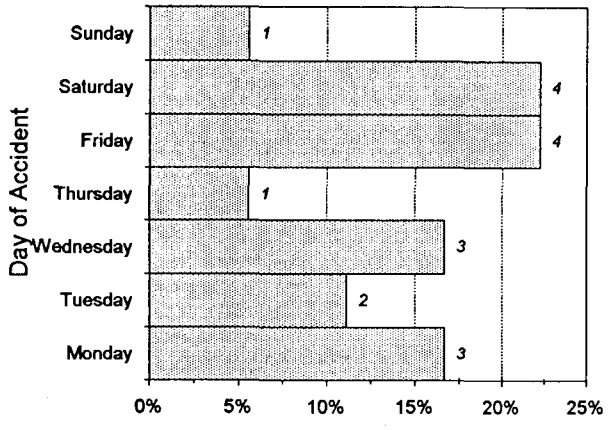


Figure 5.11.2 Accident Frequency By Collision Type
And Under Various Conditions







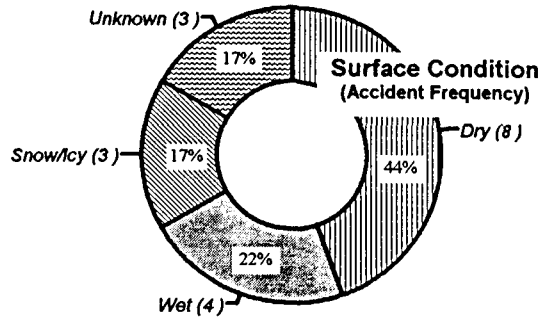


Table 5.11.1 Locust St. & Iowa St., Davenport

	1989	1990	1991	1992	1993
Total Accidents	8	6	12	19	18
# of Accidents with Fatality	0	0	0	1	0
# of Accidents with Injury	4	3	3	8	7
Accident Rate	0.77	0.77	1.54	2.44	2.31
Predominant Accident Type	N/A	N/A	N/A	Left Turn	None

6. DETAILED ANALYSIS OF ILLINOIS QUAD CITIES TOP LOCATIONS

In this Chapter, top ranked intersections in the Illinois Quad Cities were analyzed individually. This included the top ten locations for 1993. Each intersection is presented with accident an diagram and frequency of accident types. Frequency of accidents under other circumstances such as time, day, week, month, lighting and/or road surface conditions during the collisions illustrated when trends are apparent. As discussed in Chapter 4, the average accident rate for the top twenty-one locations was 2.44. In this chapter, accident rate at each location are compared with this average accident rate. A performance table of each intersection in the past five years are shown as well.

6.1 Illinois Location #1 - 16th St. & 44th Ave. Dr., Moline

Ranked first, this location experienced twenty-seven (27) accidents in 1993. Four (4) of which resulted in six (6) injured persons. Taking into account the traffic volume, the accident rate for this intersection was above average at 4.02 accidents per MEV. Left-turn crashes were the predominant accident type which occurred between north bound traffic and south bound left-turning traffic on 16th Street as shown in Figure 6.1.1. Most accidents occured during daylight hours after 9:00 a.m. The highest number of accidents occurred in the month of December (See Figure 6.1.2). This may be due to the commercial/retail land use characteristics in this area.

Forty-fourth Avenue Drive is the access road to the regional shopping mall. The east approach has four lanes with one right-turn only and one shared through and left-turn lane for west bound traffic leaving the shopping mall. The other two lanes are for traffic entering the shopping mall; however there are no pavement markings on the west approach. Sixteenth Street is a four-lane minor arterial. It provides dual left-turn lanes (one of which is shared with through traffic), one through only lane and one right-turn only lane for the north approach. The south approach has two through lanes and one left-turn only lane.

Table 6.1.1 recounts the accident history of this intersection for the past five years. Four times in the past five years, this location was in the top ten list. Left-turn crashes had always been the predominant accident type.

Figure 6.1.1 Illinois Location # 1
16th St. & 44th Ave. Dr., Moline

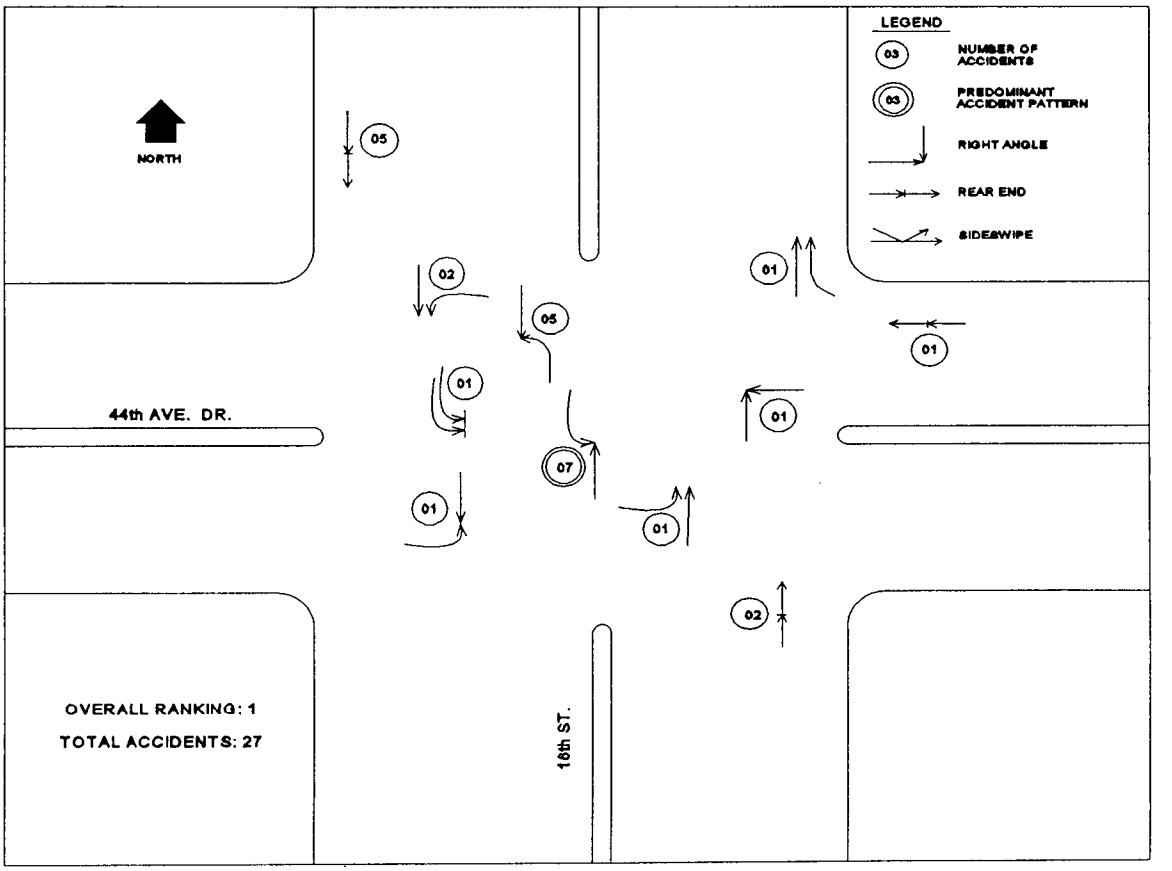


Figure 6.1.2 Accident Frequency By Collision Type
And Under Various Conditions

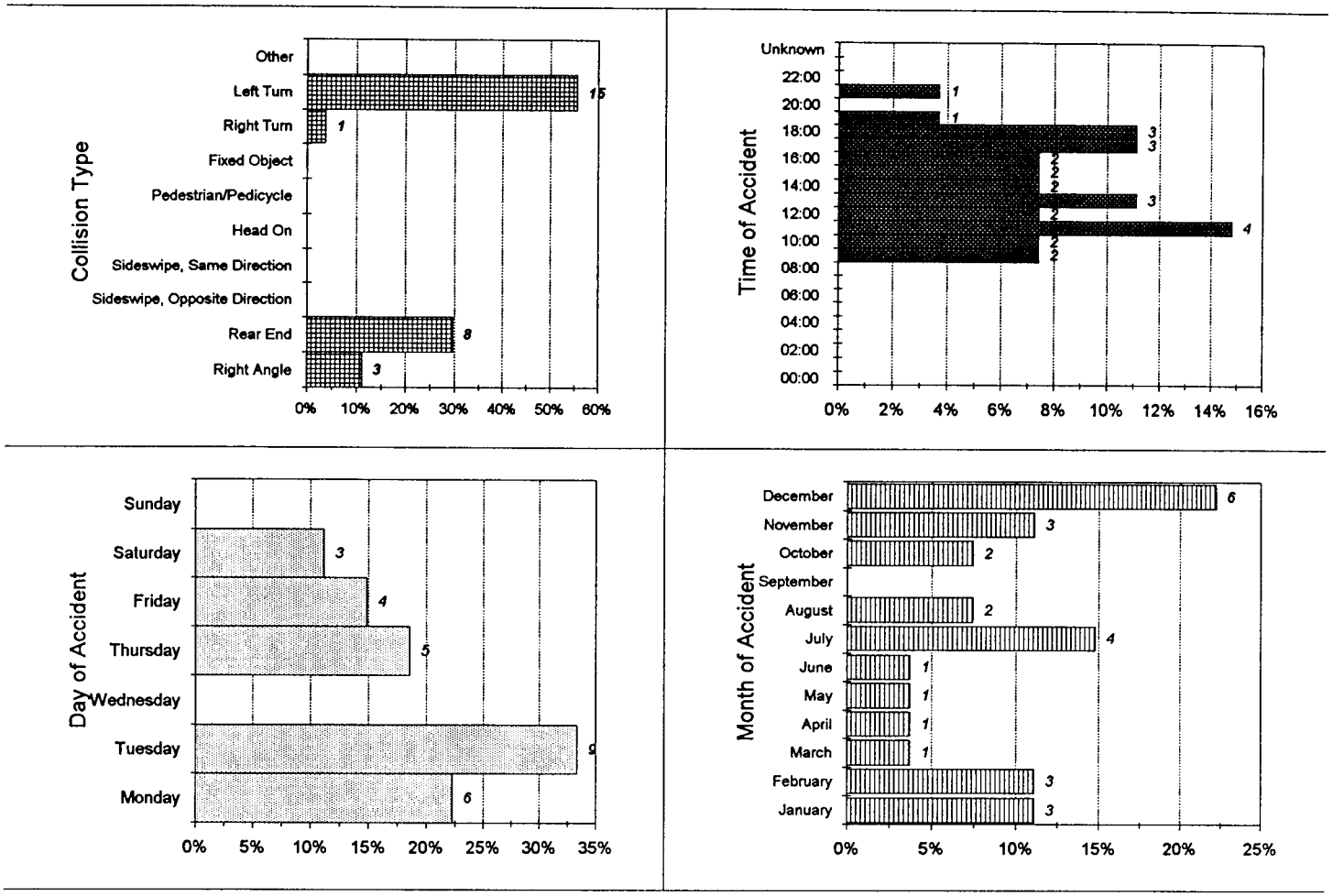


Table 6.1.1 16th St. & 44th Ave. Drive, Moline

	1989	1990	1991	1992	1993
Total Accidents	35	25	30	8	27
# of Accidents with Fatality	0	0	0	0	0
# of Accidents with Injury	11	11	8	4	4
Accident Rate	3.75	3.70	4.46	1.19	4.02
Predominant Accident Type	Left Turn	Left Turn	Left Turn	N/A	Left Turn

6.2 Illinois Location #2 - Kennedy Dr. & 42 Ave. NFR, East Moline

Ranked second, this location experienced twenty-nine (29) accidents in 1993. Seven (7) of which resulted in eleven (11) injured persons. Taking into account the traffic volume, the accident rate for this intersection was above average at 2.61 accidents per MEV. Left-turn crashes were the predominant accident type which occurred between west bound through traffic and left-turning traffic from west on 42nd Avenue as shown in Figure 6.2.1. Figure 6.2.2 shows accident frequency by collision type and under various conditions.

Forty-second Avenue is a four-lane divided major arterial with a posted speed limit of 45 mph. It has left-turn only lanes at both east and west approaches. Kennedy Drive is a two-lane arterial. In addition to the intersection with 42nd Avenue, Kennedy Drive is crossed by two two-lane frontage roads to the immediate north and south of the 42nd Avenue intersection. The potential for conflicting vehicular movements compounded by the existence of concentrated retail and other service businesses surrounding this entire area.

Table 6.2.1 recounts the accident history of this intersection for the past five years. It has been in the top ten list for at least the past five years.

Figure 6.2.1 Illinois Location # 2
Kennedy Dr. & 42nd Ave. (NFR), East Moline

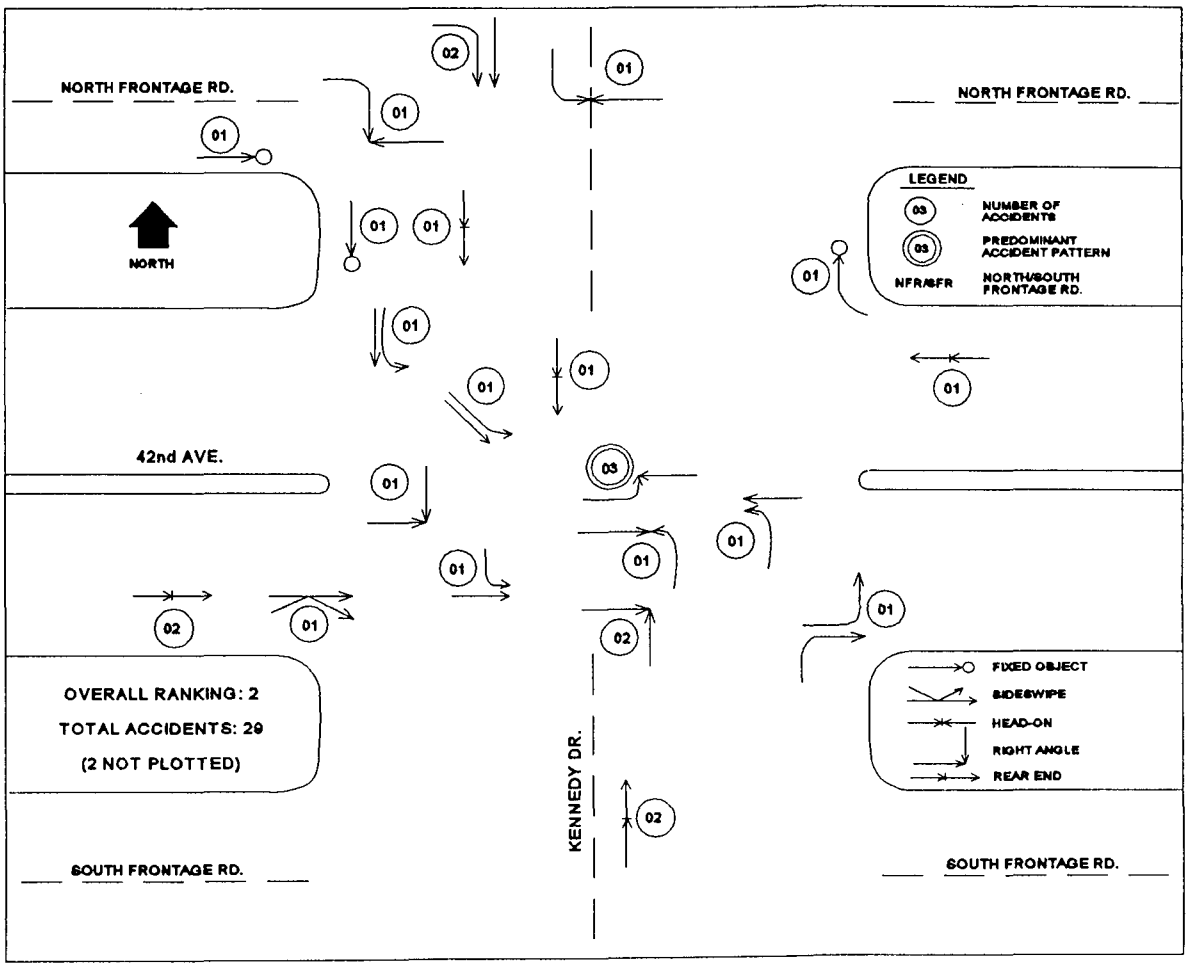


Figure 6.2.2 Accident Frequency By Collision Type
And Under Various Conditions

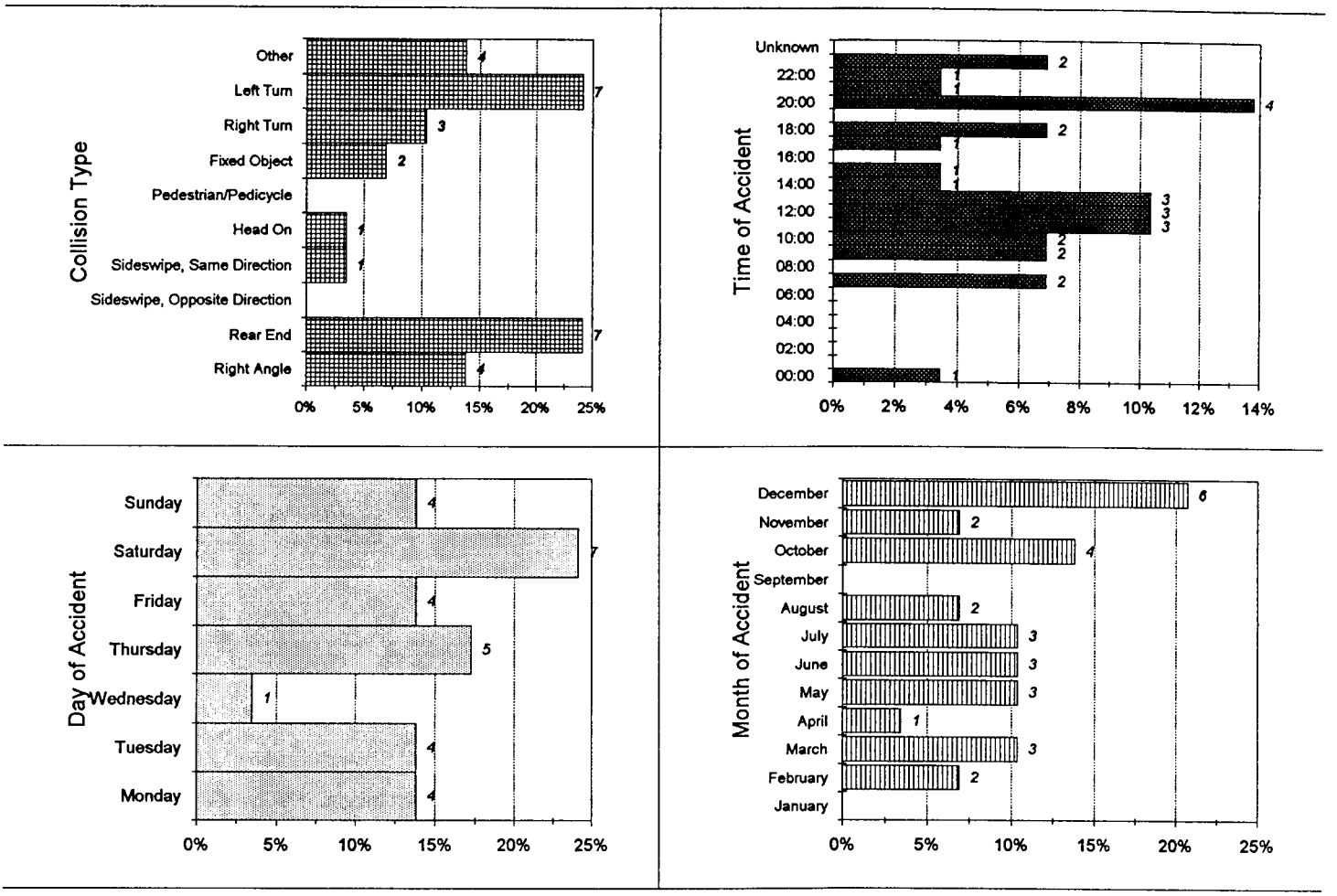


Table 6.2.1 Kennedy Dr. & 42nd Ave. NFR, East Moline

	1989	1990	1991	1992	1993
Total Accidents	29	20	18	23	29
# of Accidents with Fatality	0	0	0	0	0
# of Accidents with Injury	15	7	9	8	7
Accident Rate	2.77	1.78	1.61	2.07	2.61
Predominant Accident Type	Left Turn	Rear End	Left Turn	N/A	Left Turn

6.3 Illinois Location #3 - 41st St. & John Deere Expwy., Moline

Ranked third, this location experienced twenty-eight (28) accidents in 1993. Seventeen (17) of which resulted in thirty (30) injured persons. Taking into account the traffic volume, the accident rate for this intersection was below average at 1.73 accidents per MEV. Rear-end crashes were the predominant accident type (39% of total accidents) they occurred among east bound traffic on John Deere Road. Rear-end crashes were also very frequent (36% of total) among west bound traffic on John Deere Road. Figure 6.3.2 shows accident history by collision type and under various conditions.

John Deere Expressway is a four-lane divided major arterial as well as a state route. It has a speed limit of 55 mph at this location. Forty-first Street is a four-lane arterial. Left-turn lanes are provided for all approaches at this intersection. A left-turn only signal is acculated when vehicles are waiting in the left turn lane. Right-turn lanes are provided and channelized at each corner.

Table 6.3.1 recounts the accident history of this intersection for the past five years. The year 1993 marked a record high for accidents at this location. This put it back on the top ten list after a two year hiatus. Rear-end accidents were predominant in 1989 and 1990 as well.

Figure 6.3.1 Illinois Location # 3
41st St. & IL.5/John Deere Expwy., Moline

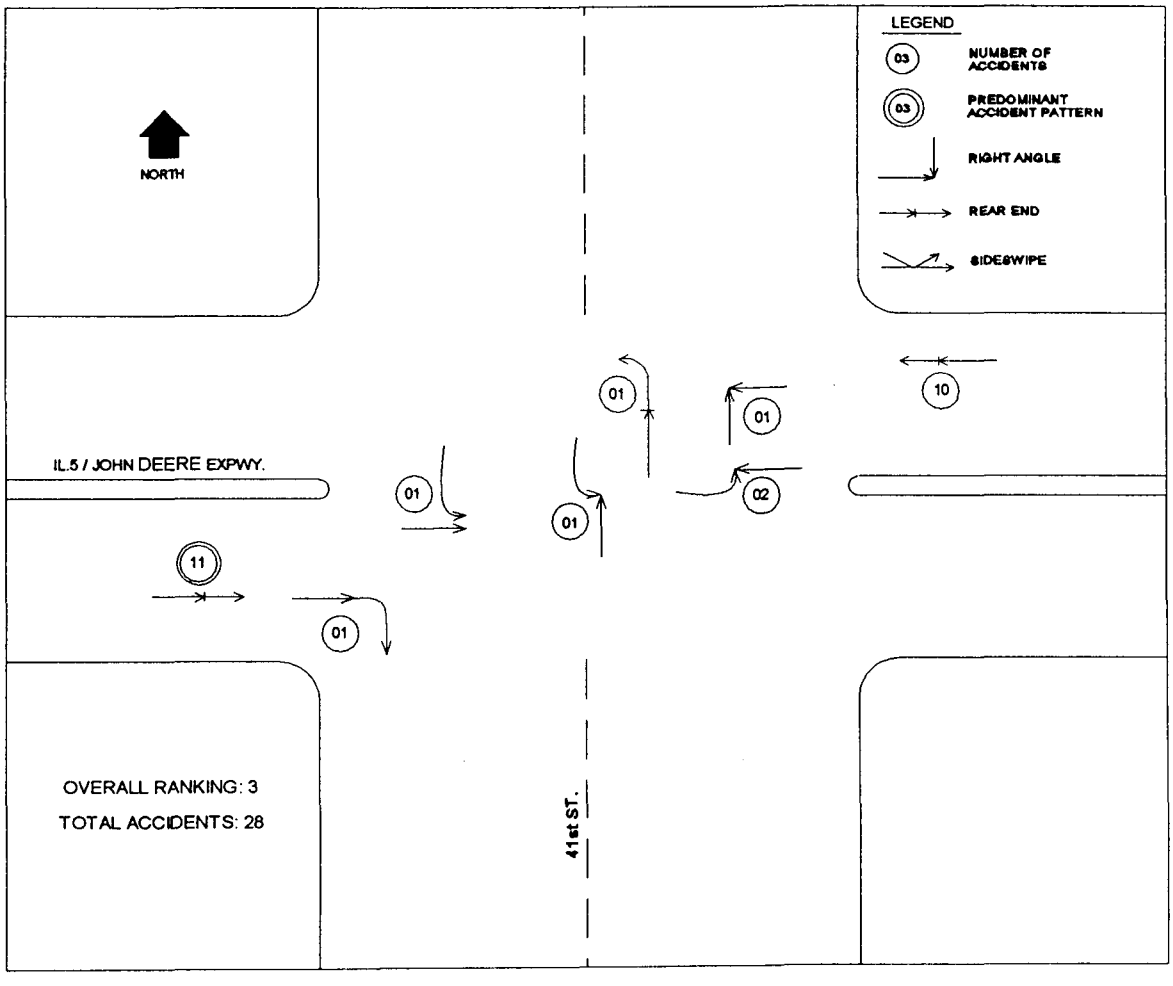
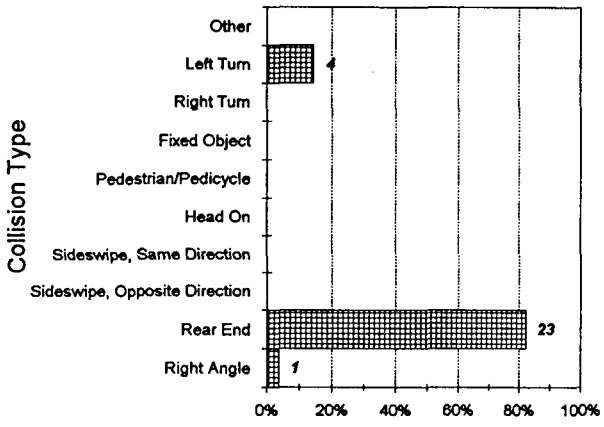
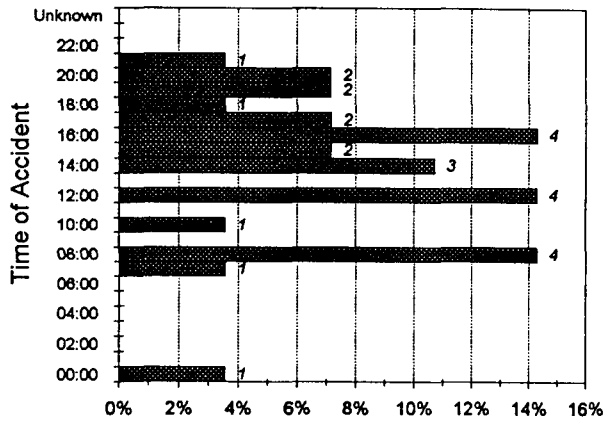
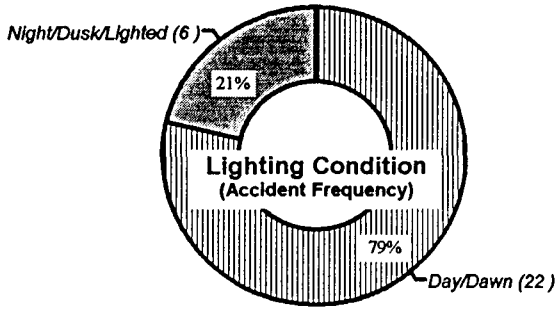


Figure 6.3.2 Accident Frequency By Collision Type
And Under Various Conditions







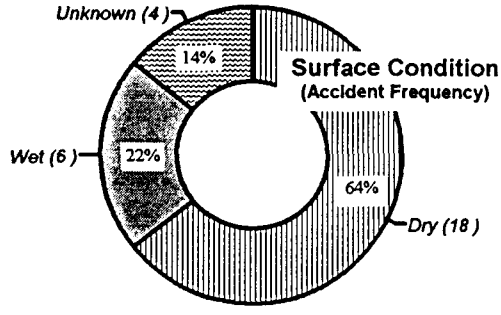


Table 6.3.1 41st St. & John Deere Expwy., Moline

	1989	1990	1991	1992	1993
Total Accidents	11	20	16	11	28
# of Accidents with Fatality	0	0	0	0	0
# of Accidents with Injury	5	8	5	4	17
Accident Rate	0.80	1.23	0.98	0.68	1.73
Predominant Accident Type	Rear End	Rear End	N/A	N/A	Rear End

6.4 Illinois Location #4 - 16th St. & John Deere Rd., Moline

Ranked fourth, this location experienced twenty-eight (28) accidents in 1993. Ten (10) of which resulted in sixteen (16) injured persons. Taking into account the traffic volume, the accident rate for this intersection was below average at 2.01 accidents per MEV. Rear-end crashes were very frequent (29% of total) among west bound traffic and among east bound traffic on John Deere Road as shown in Figure 6.4.1. Rear-end crashes were also frequent among east bound traffic from south on 16th Street. Figure 6.4.2 shows accident frequency by collision type under various conditions.

At this intersection, each of the four approaches has different physical characteristics. The west approach of John Deere Road has one left-turn lane, three through lanes and one right-turn only lane for the east bound traffic. The speed limit is 45 mph. While the east approach of John Deere Road has dual left-turn only lanes, one right-turn lane and two through lanes for the west bound traffic. The speed limit is 55 mph. Three lanes were provided for traffic leaving the intersection from both the east and west on John Deere Road. Sixteenth Street has two through lanes, one left-turn and one right-turn only lanes for both south and north approaches entering the intersection. There are two lanes each for traffic leaving the intersection.

Table 6.4.1 recounts the accident history of this intersection for the past five years.

Figure 6.4.1 Illinois Location # 4
16th St. & IL.5/John Deere Expwy., Moline

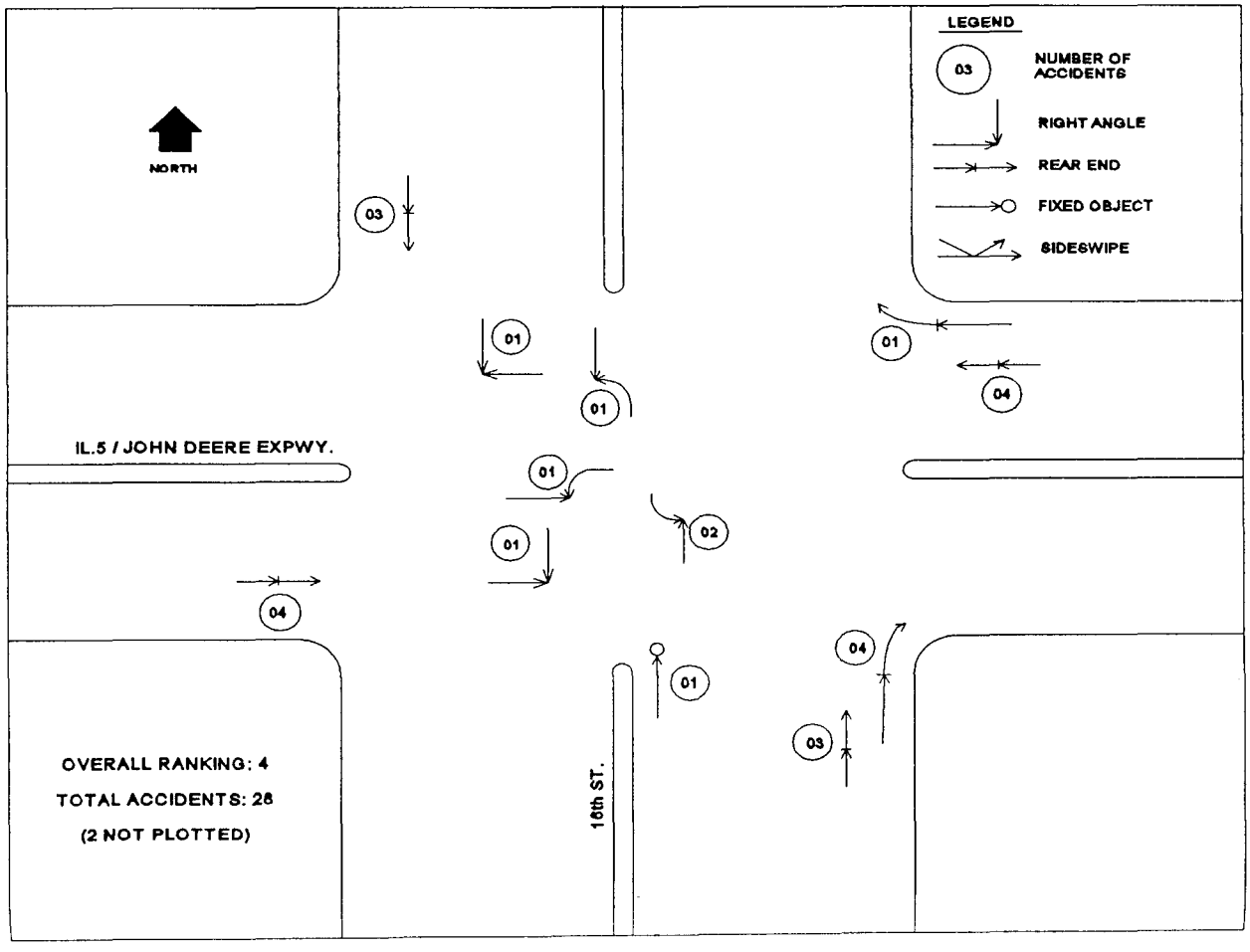
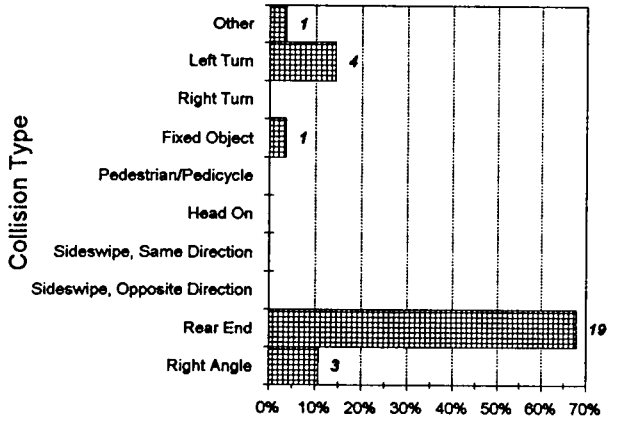
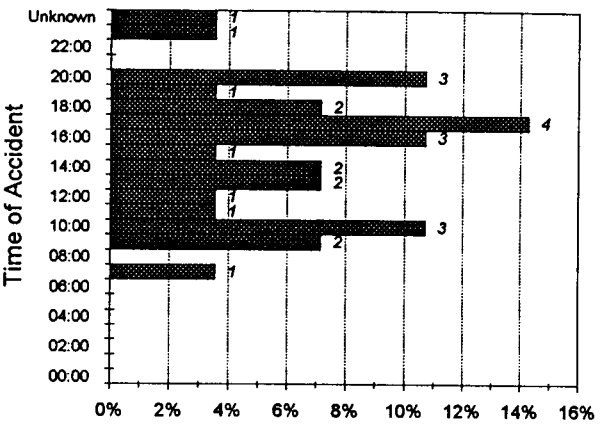
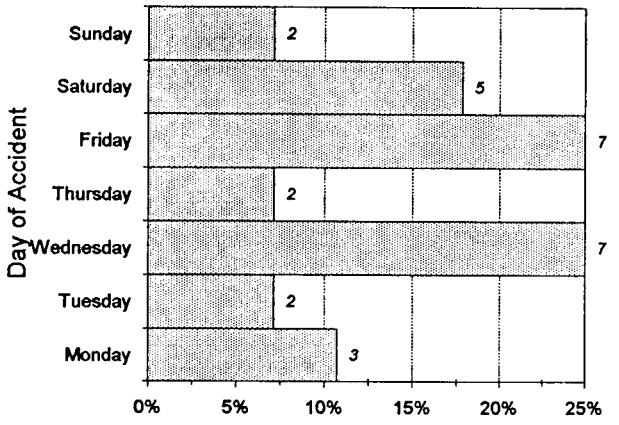


Figure 6.4.2 Accident Frequency By Collision Type
And Under Various Conditions







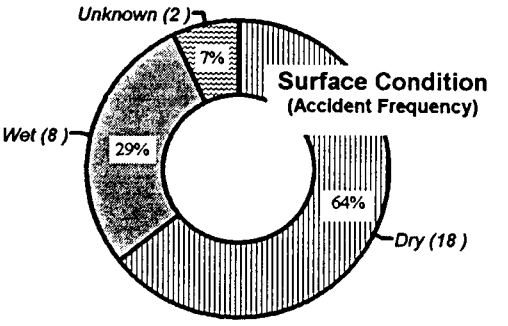


Table 6.4.1 16th St. & John Deere Rd., Moline

	1989	1990	1991	1992	1993
Total Accidents	25	34	26	21	28
# of Accidents with Fatality	0	0	0	0	0
# of Accidents with Injury	8	12	10	6	10
Accident Rate	1.92	2.44	1.86	1.51	2.01
Predominant Accident Type	Left Turn	N/A	Left Turn	None	None

6.5 Illinois Location #5 - 16th St. & 23rd Ave., Moline

Ranked a tie with Location # 4, this intersection experienced twenty-seven (27) accidents in 1993. Six (6) of which resulted in seven (7) injured persons. Taking into account the traffic volume, the accident rate for this intersection was just below average at 2.36 accidents per MEV. Rear-end crashes were the predominant accident type. They occurred among west bound traffic on 23rd Avenue as shown in Figure 6.5.1. Figure 6.5.2 shows accident frequency by collision type under various conditions.

Sixteenth Street is a four-lane arterial road while 23rd Avenue is a four-lane major arterial in Moline. Left-turn only lanes are available at east and north approaches of this intersection. A right-turn only lane is available at the east approach on 23rd Avenue. This intersection is the strategic connector for east-west traffic to/from 23rd Avenue and 19th Avenue. It also connects downtown Moline to the north with the major shopping area in the south. At the intersection, businesses such as a gas station, a fast food restaurant, a health club and other retailers and offices generate traffic from various access drives all around.

Table 6.5.1 recounts the accident history of this intersection for the past five years. The total number of accidents reached an all time high in 1993.

Figure 6.5.1 Illinois Location # 5
16th St. & 23rd Ave., Moline

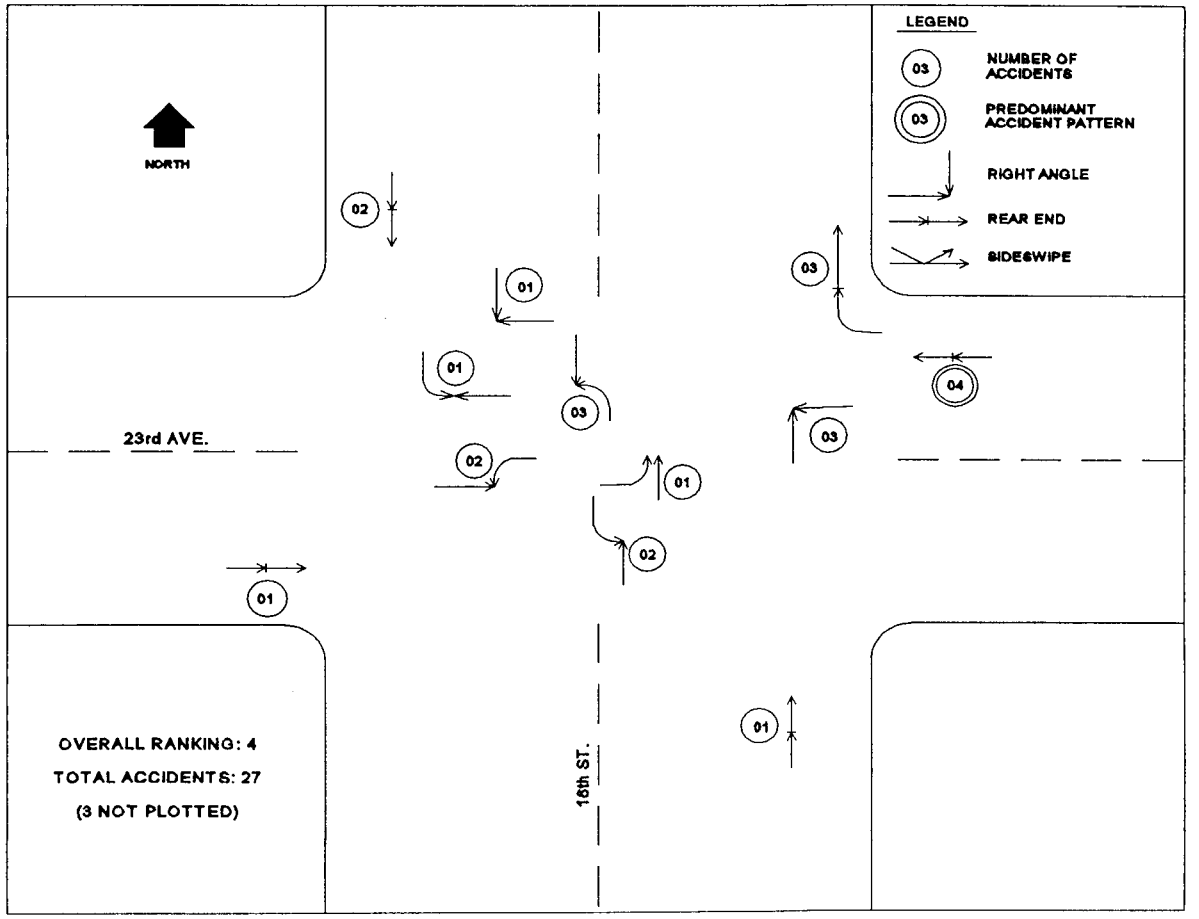
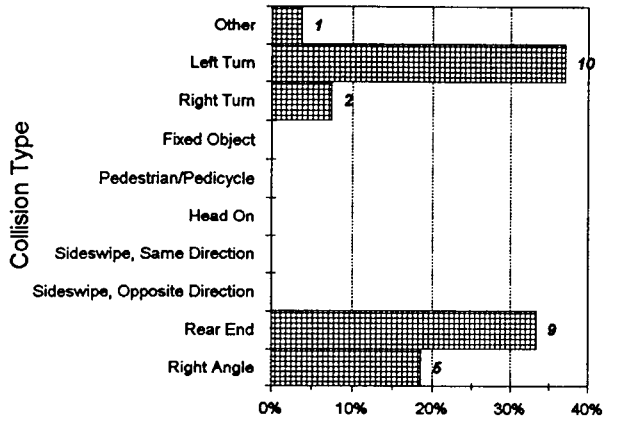
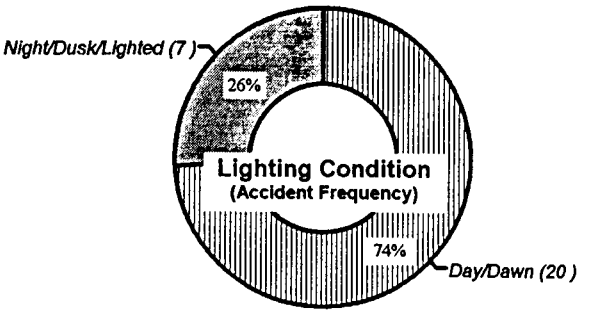
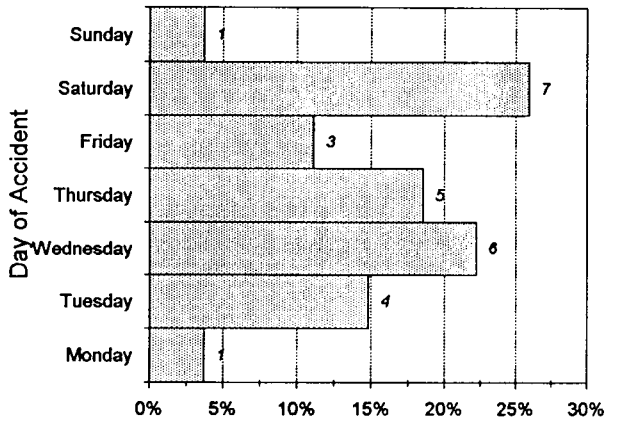


Figure 6.5.2 Accident Frequency By Collision Type
And Under Various Conditions







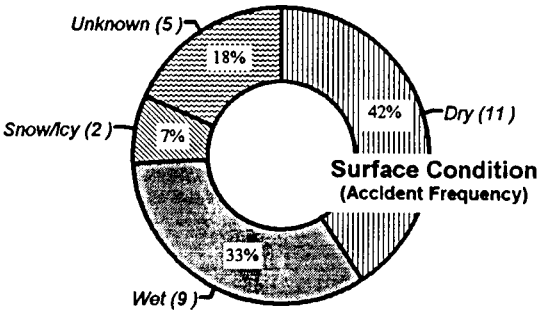


Table 6.5.1 16th St. & 23rd Ave., Moline

	1989	1990	1991	1992	1993
Total Accidents	20	11	13	10	27
# of Accidents with Fatality	0	0	0	0	0
# of Accidents with Injury	8	5	4	3	6
Accident Rate	1.9	1.03	1.22	0.94	2.55
Predominant Accident Type	Left Turn	N/A	N/A	N/A	Rear End

6.6 Illinois Location #6 - 41st St. & 38th Ave./Coaltown Rd., Moline

Ranked sixth, this location experienced nineteen (19) accidents in 1993. Seven (7) of which resulted in twelve (12) injured persons. Taking into account the traffic volume, the accident rate for this intersection was well above average at 4.93 accidents per MEV. Right-angle crashes were the predominant accident type. They occurred between west bound traffic on 38th Avenue and south bound traffic on 41st Street as shown in Figure 6.6.1.

Thirty-eighth Avenue is a two-lane collector road while 41st Street is a four-lane arterial. Two gas stations/convenient stores are located at the southwest and northwest corners of the intersection with access driveways via 38th Avenue. Figure 6.6.2 shows 84% of the accidents happened during daylight hours and 68% of the time the pavement was dry.

Table 6.6.1 recounts the accident history of this intersection for the past five years. In 1993 total accidents were at a record high.

Figure 6.6.1 Illinois Location # 6
41st St. & 38th Ave./Coaltown Rd., Moline

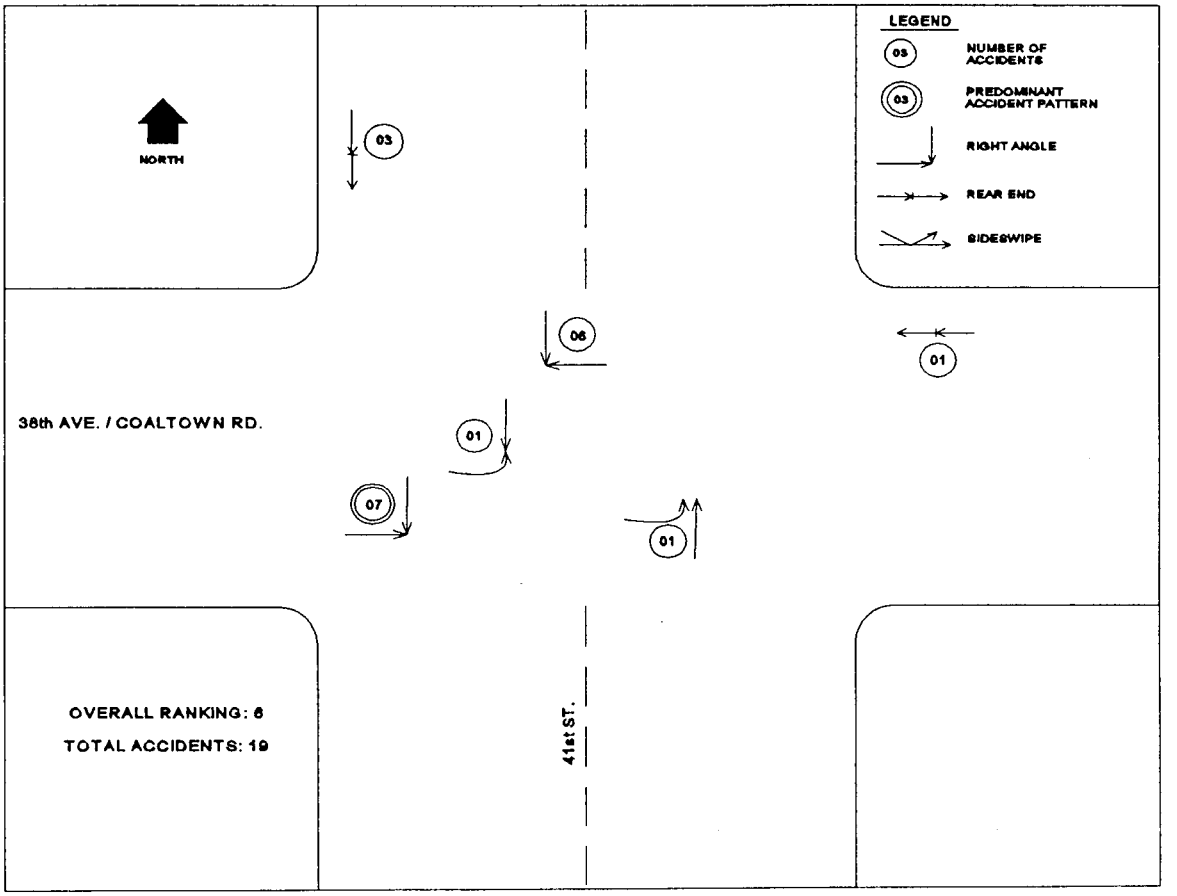
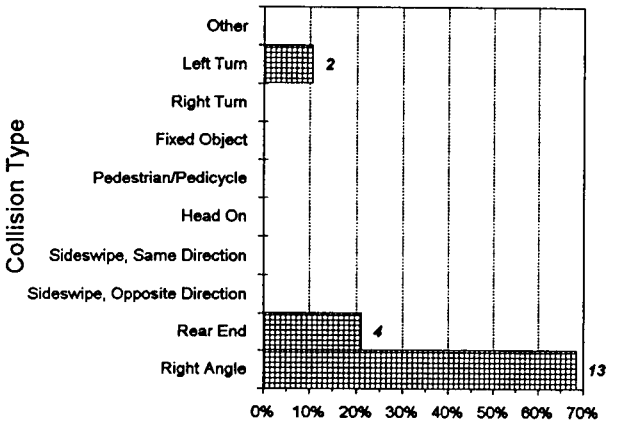
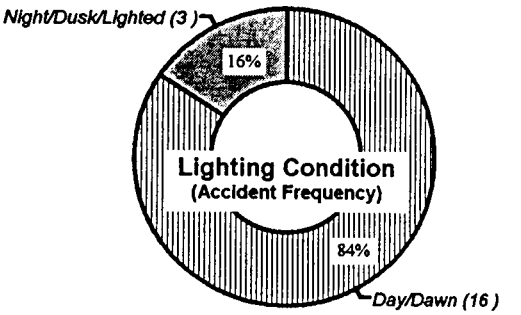
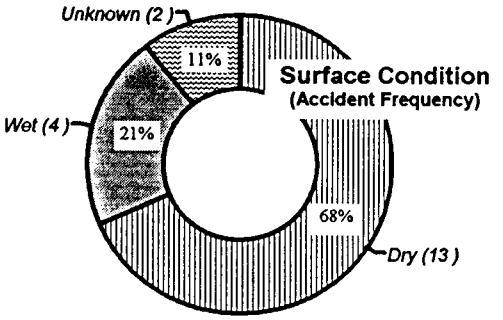


Figure 6.6.2 Accident Frequency By Collision Type
And Under Various Conditions







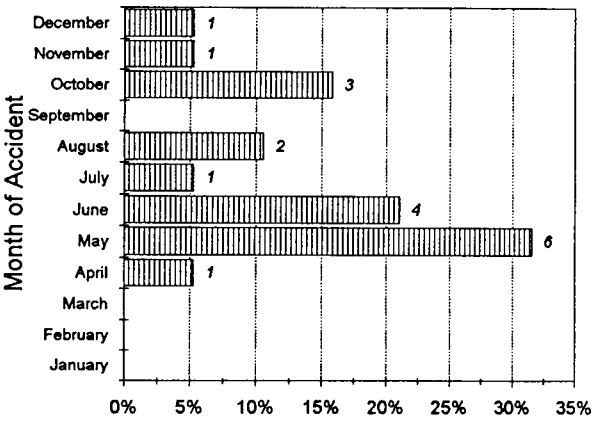


Table 6.6.1 41th St. & 38th Ave., Moline

	1989	1990	1991	1992	1993
Total Accidents	-	9	6	-	19
# of Accidents with Fatality	-	0	0	-	0
# of Accidents with Injury	-	2	3	-	7
Accident Rate	-	1.85	1.51	-	4.93
Predominant Accident Type	-	N/A	N/A	-	Right Angle

6.7 Illinois Location #7 - 7th St. & 42nd Ave. (NFR), East Moline

Ranked seventh, this location experienced twenty-three (23) accidents in 1993. Ten (10) of which resulted in eighteen (18) injured persons. Taking into account the traffic volume, the accident rate for this intersection was below average at 2.05 accidents per MEV. Left-turn crashes were the predominant accident type. They occurred between west bound traffic from south on 7th Street and west bound through traffic on 42nd Avenue as shown in Figure 6.7.1.

Forty-second Avenue is a four-lane divided major arterial with a speed limit of 45 mph. It has left-turn only lanes at both the east and west approaches. Seventh Street is a four-lane arterial road. In addition, the North Frontage Road crosses 7th Street directly adjacent to the main intersection of 7th and 42nd. Businesses are quite concentrated around the 7th Street and the Frontage Road. More accidents occurred in the afternoon hours between one and five (See Figure 6.7.2).

Table 6.7.1 recounts the accident history of this intersection for the past five years.

Figure 6.7.1 Illinois Location # 7
7th St. & 42nd Ave. (NFR), East Moline

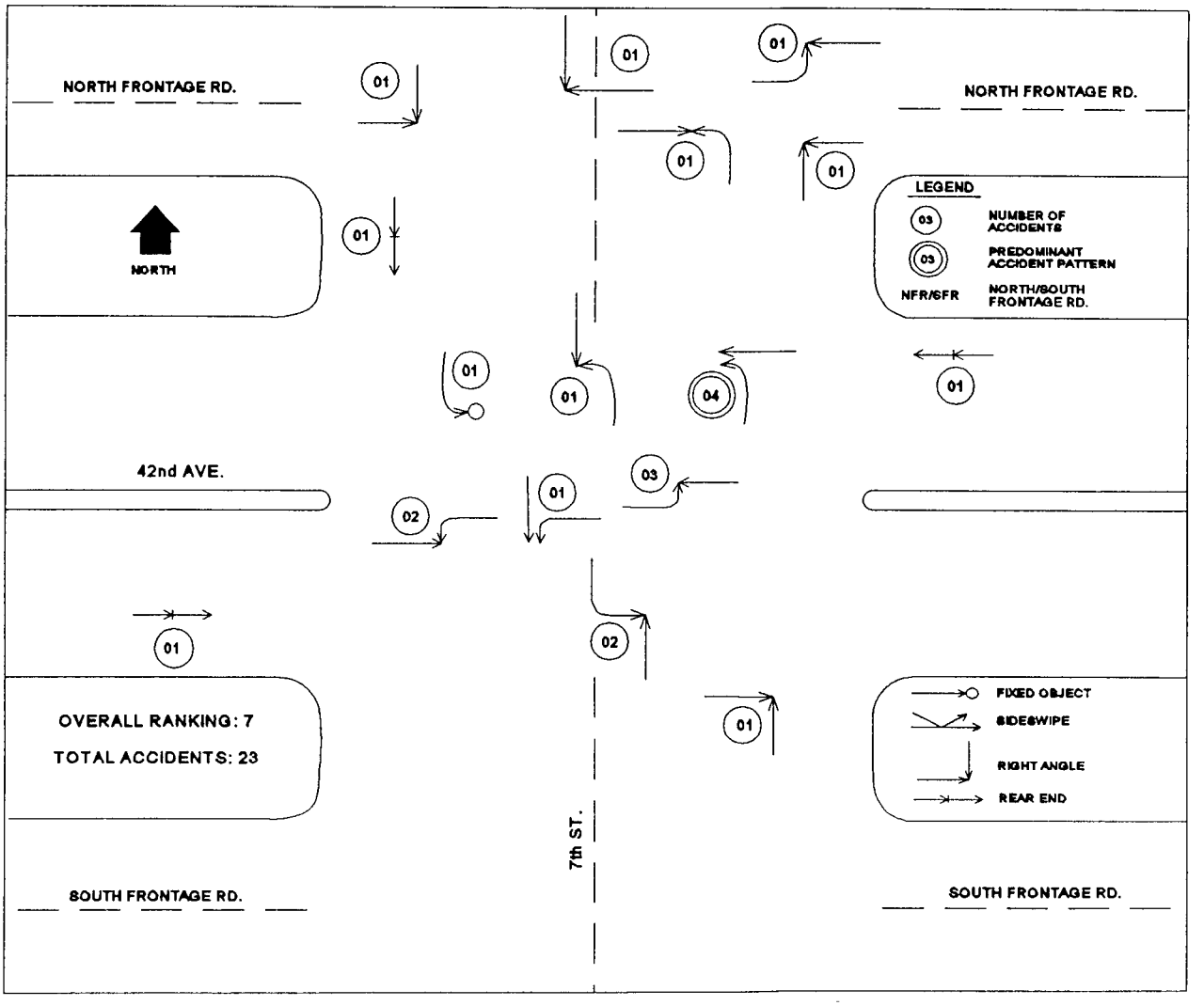
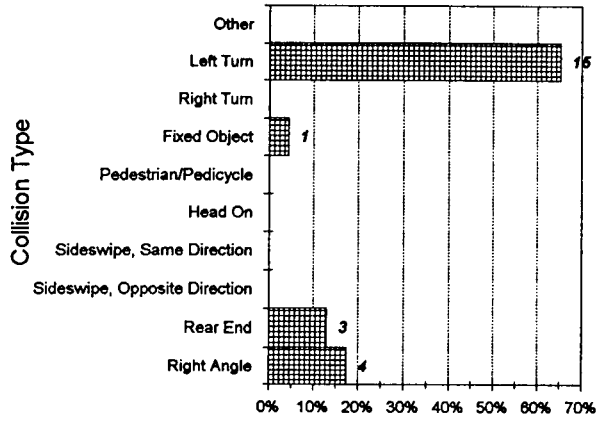
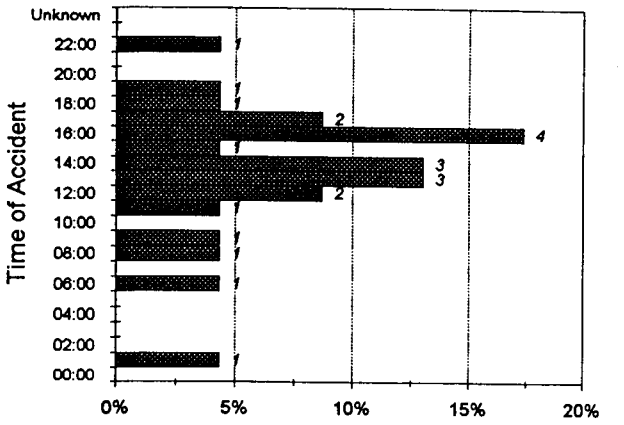
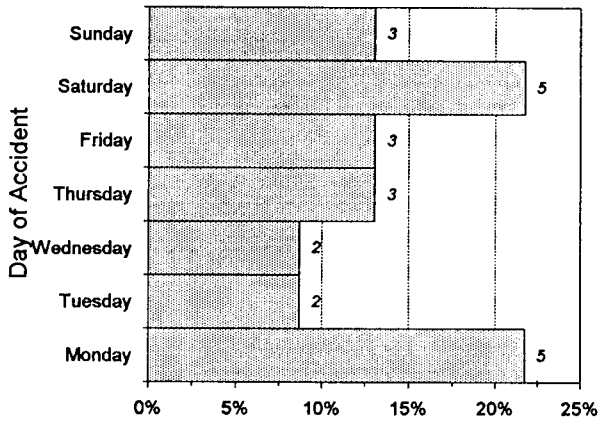


Figure 6.7.2 Accident Frequency By Collision Type
And Under Various Conditions







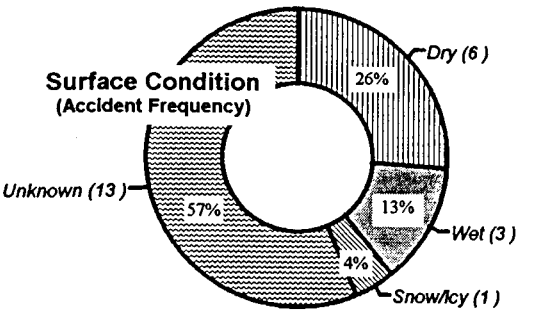


Table 6.7.1 7th St. & 44th Ave. NFR, East Moline

	1989	1990	1991	1992	1993
Total Accidents	28	37	36	21	23
# of Accidents with Fatality	0	0	0	0	0
# of Accidents with Injury	15	19	14	7	10
Accident Rate	2.81	3.30	3.21	1.87	2.05
Predominant Accident Type	Left Turn	Left Turn	Left Turn	Left Turn	Left Turn

6.8 Illinois Location #8 - 12th St. & 12th Ave., Moline

Ranked eighth, this intersection experienced thirteen (13) accidents in 1993. Four (4) of which resulted in five (5) injured persons. Taking into account the traffic volume, the accident rate for this intersection was above average at 3.63 accidents per MEV. Right-angle crashes were the predominant accident type (77%). They occurred between south bound traffic on 12th Street and west bound traffic on 12th Avenue as shown in Figure 6.8.1 and Figure 6.8.2.

This segment of Twelfth Avenue is a local road while 12th Street is a collector. Each road has two travel lanes. The intersection is three-way stop-sign controlled giving the northern approach right-of-way without a stop. The entire intersection is located within a residential area. Special road features include the 12th Street steep uphill slope from the north and to the south in a winding curve. Twelfth Street is also used as the regularly scheduled transit bus route.

Table 6.8.1 recounts the accident history of this intersection for the past five years. Right-angle crashes have been the predominant accident type for the past three years.

Figure 6.8.1 Illinois Location # 8
12th St. & 12th Ave., Moline

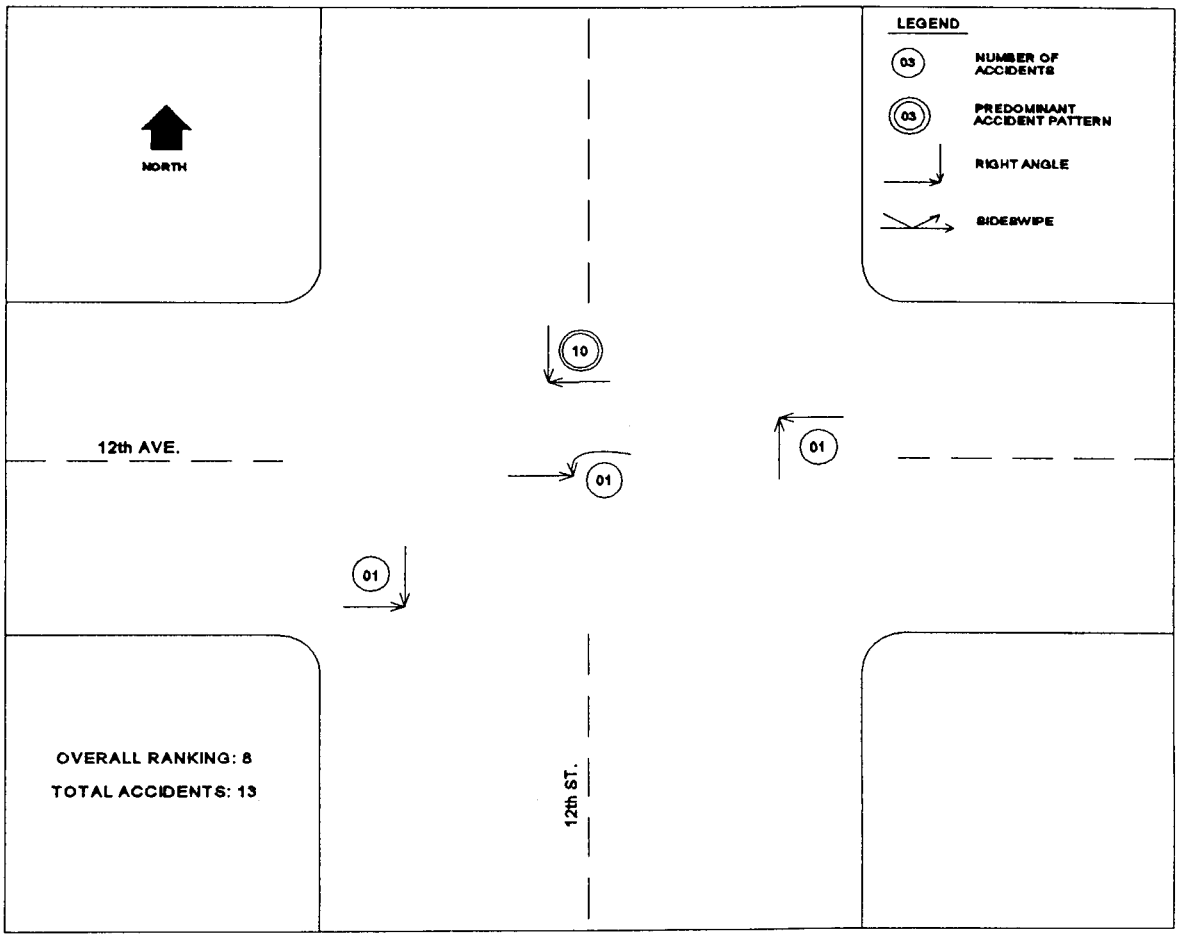
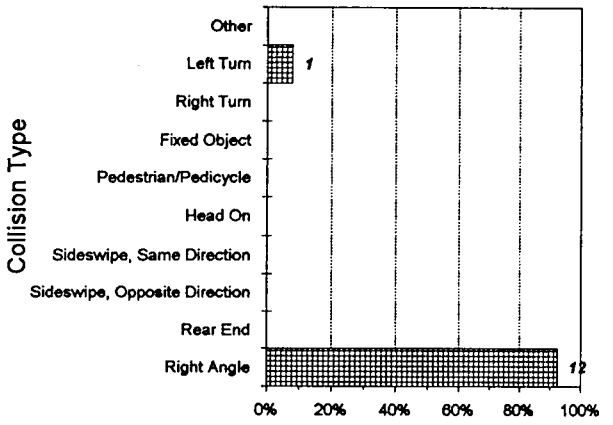
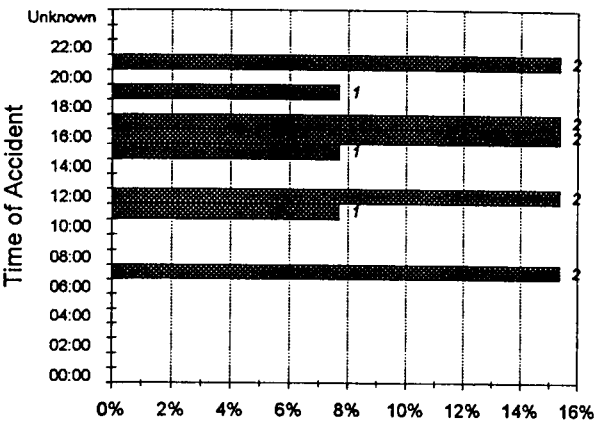
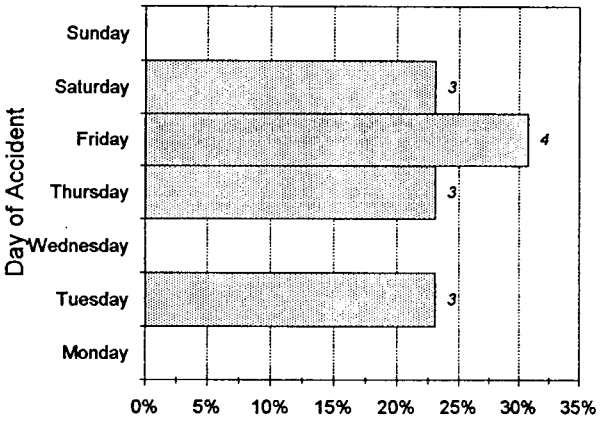


Figure 6.8.2 Accident Frequency By Collision Type
And Under Various Conditions







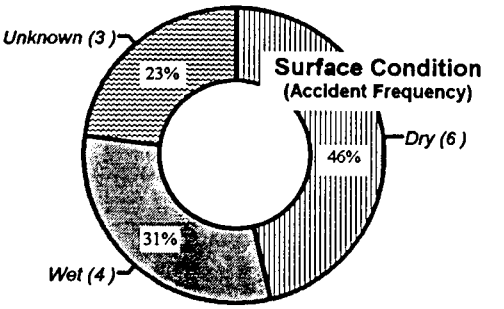


Table 6.8.1 12th St. & 12th Ave., Moline

	1989	1990	1991	1992	1993
Total Accidents	3	6	4	15	13
# of Accidents with Fatality	0	0	0	0	0
# of Accidents with Injury	1	1	0	3	4
Accident Rate	0.69	1.84	1.11	4.18	3.63
Predominant Accident Type	N/A	N/A	Right Angle	Right Angle	Right Angle

6.9 Illinois Location #9 - 19th St. NB & 23rd Ave., Moline

Ranked ninth, this location experienced eighteen (18) accidents. Nine (9) of which resulted in thirteen (13) injured persons. Taking into account the traffic volume, the accident rate for this intersection was below average at 1.44 accidents per MEV. Rear-end crashes were most frequent. They occurred on the west and east approaches of 23rd Avenue as shown in Figure 6.9.1.

Twenty-third Avenue is a four-lane major arterial road while 19th Street is a frontage road paralleling the Interstate 74 corridor. At this intersection, 19th Street is a one-way north with left and right-turn only lanes and two through lanes. Twenty-third Avenue has two through lanes and left/right-turn only lanes for its west/east approaches. Immediately south and north of this intersection are the exit and on ramps for I-74 traffic. Figure 6.9.2 shows the frequency of collision types under various conditions.

Table 6.9.1 recounts the accident history of this intersection for the past five years.

Figure 6.9.1 Illinois Location # 9
19th St. NB & 23rd Ave., Moline

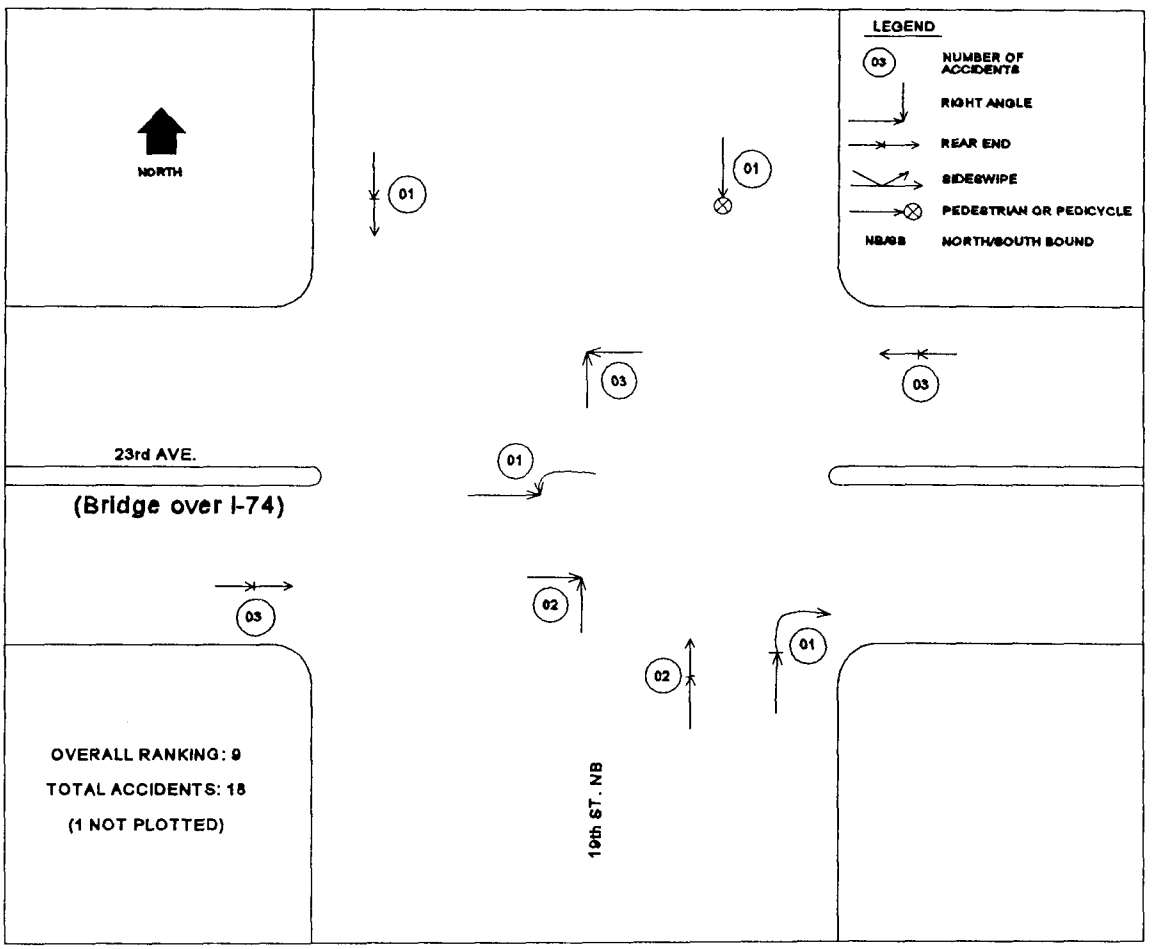
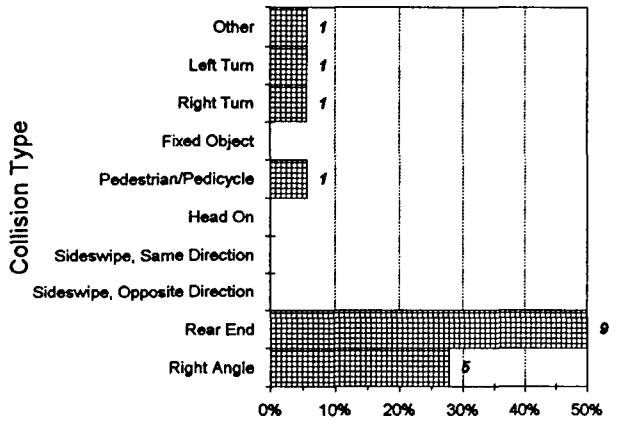
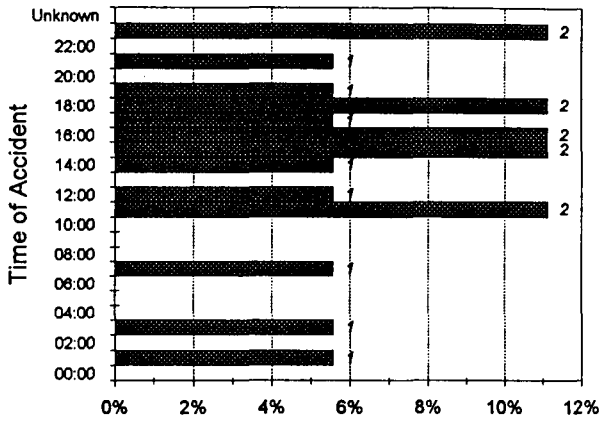
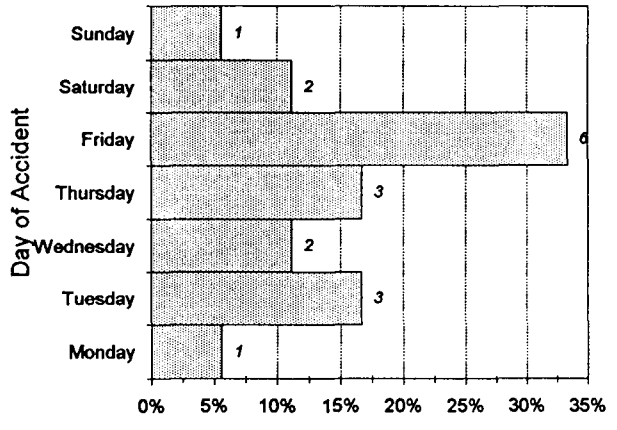


Figure 6.9.2 Accident Frequency By Collision Type
And Under Various Conditions







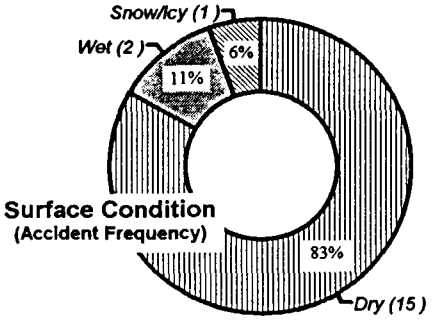


Table 6.9.1 19th St. NB & 23rd Ave., Moline

	1989	1990	1991	1992	1993
Total Accidents	14	15	29	10	18
# of Accidents with Fatality	0	0	0	0	0
# of Accidents with Injury	7	3	12	2	9
Accident Rate	1.14	1.08	2.32	0.80	1.44
Predominant Accident Type	N/A	N/A	Rear End	N/A	None

6.10 Illinois Location #10 - 11th St. & 42nd Ave. NFR, East Moline

Ranked a tie with location #9, this location experienced seventeen (17) accidents. Five (5) of which resulted in nine (9) injured persons. Taking into account the traffic volume, the accident rate for this intersection was below average at 1.99 accidents per MEV. Rear-end crashes were the predominant accident type. They occurred among the east bound traffic on 42nd Avenue as shown in Figure 6.10.1.

Forty-second Avenue is a four-lane divided major arterial with a posted speed limit of 45 mph. It has left-turn only lanes at both east and west approaches. Eleventh Street in East Moline is a collector road which ends at the North Frontage Road for this segment. The intersections are uniquely controlled by a set of signals for the South Frontage Road (a four-way) intersection, for the North Frontage Road (a "T") intersection and for the flow on 42nd Avenue. The signals installed at the frontage road intersections are difficult to see when turning right from 42nd onto 11th Street. The close proximity of the three intersections also makes it very complex. Frequency of collision types and accidents under various conditions is shown in Figure 6.10.2.

Table 6.10.1 recounts the accident history of this intersection for the past five years.

Figure 6.10.1 Illinois Location # 10
11th St. & 42nd Ave. (NFR), East Moline

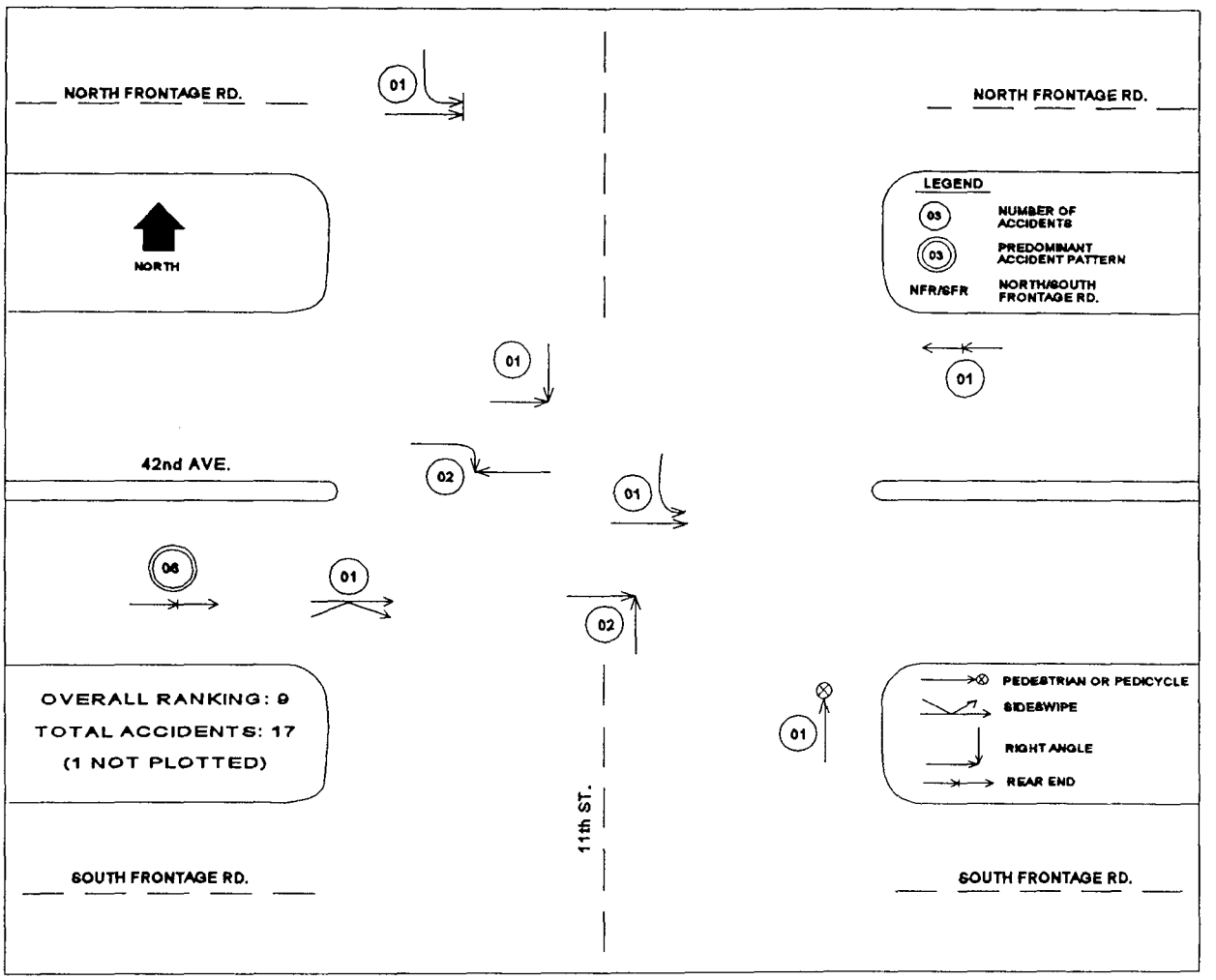
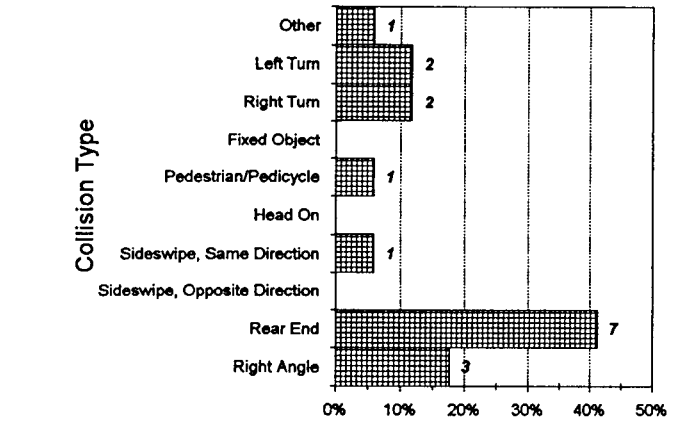
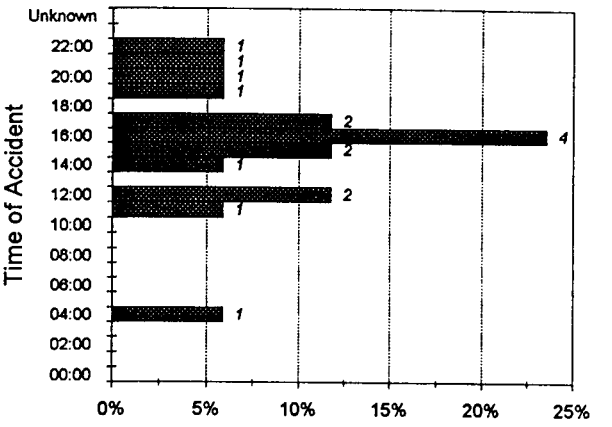
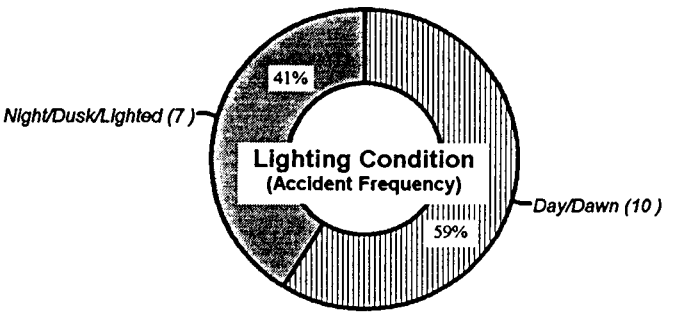


Figure 6.10.2 Accident Frequency By Collision Type
And Under Various Conditions







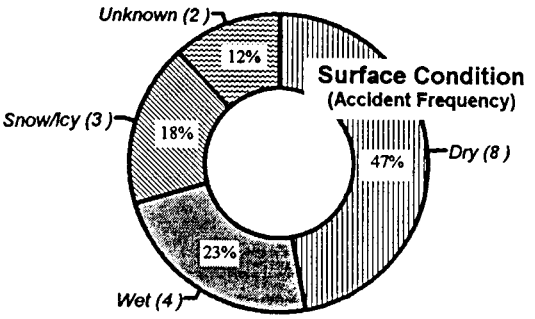


Table 6.10.1 11th St. & 42nd Ave. NFR, East Moline

	1989	1990	1991	1992	1993
Total Accidents	16	23	23	15	17
# of Accidents with Fatality	0	0	0	0	0
# of Accidents with Injury	5	8	12	4	5
Accident Rate	1.93	2.69	2.69	1.76	1.99
Predominant Accident Type	Right Angle	Right Angle	Right Angle	Right Angle	Rear End

7. STATUS OF PREVIOUSLY TOP RANKED ACCIDENT LOCATIONS IN 1993

As a follow up to the top ranked accident locations in the 1992 accident study, this Chapter identifies the status of those locations with or without improvements. A survey was sent to each jurisdiction for ranked intersections and information on any intersection improvements made between 1992 and 1993 was requested. The effectiveness of mitigation measures are therefore evaluated.

Table 7.0.1 shows the status for Iowa locations. There was a major reduction of accidents at 3rd Street and Harrison Street/U.S. 61 SB which may be attributed to the addition of overhead signals. Other intersections undergoing improvements also show better safety status except the Eastern Avenue and Kimberly Road intersection.

The status of Illinois locations in Table 7.0.2 illustrates the improvements at 12th Avenue and 12th Street in Moline.

Table 7.0.1 Status of Previously Top Ranked Accident Locations Iowa Quad Cities 1992 Compared to 1993

Locations in City of Davenport	Total # of Accidents 92/93	Overall Ranking 92/93	Type of Intersection Improvement between 1992 & 1993
3rd St & Harrison St.	32/12	1/33	Lighting; Signal head display; Upgrade controller
U.S. 61 SB/Welcome Way & Kimberly Rd.	35/31	2/2	
Locust St., Division St., & Hickory Grove Rd.	26/23	2/5	
Locust St. & Iowa St.	19/18	4/9	
U.S. 61 NB/Brady St. & Kimberly Rd.	27/20	5/14	Adjust timing; Pavement marking
Eastern Ave. & U.S. 6/Kimberly Rd.	23/31	6/1	Adjust timing; Signal head display; Upgrade controller
Elmore Ave. & U.S. 6/Kimberly Rd.	22/22	7/9	
Locust St. & Brady St.	20/13	8/38	
3rd St & Gaines St.	17/*	9/*	Lighting; Signal head display; Upgrade controller
2nd St & Ripley St.	11/8	9/33	Lighting; Signal head display; Upgrade controller

* The intersection dropped out of the highest accident (with 7 or more accidents) location list in 1993.

Table 7.0.2 Status of Previously Top Ranked Accident Locations
Illinois Quad Cities 1992 Compared to 1993

Locations	Total # of Accidents 92/93	Overall Ranking 92/93	Type of Intersection Improvements between 1992 & 1993
Kennedy Dr & 42nd Ave. (NFR),E.M.	23/29	1/2	
12th St & 12th Ave., Mo.	15/13	2/8	Pavement marking
7th St & 42nd Ave. (NFR), E.M.	21/23	3/7	
16th St & IL 5/J.Deere Expwy., Mo.	21/28	4/4	Adjust timing; Pavement marking ; Add overhead signing
Archer Dr & 42nd Ave. (NSFR), E.M.	16/*	5/*	
19th St & 7th Ave., Mo.	15/*	6/*	
19th St & 6th Ave., Mo.	14/7	6/24	
11th St & 42nd Ave. (NFR),E.M.	15/17	8/9	
7th St. & 16th Ave., E.M.	12/*	8/*	
19th St & 12th Ave., Mo.	15/8	10/42	

* The intersection dropped out of the highest accident (with 7 or more accidents) location list in 1993.

APPENDIX A

COSTS OF TYPICAL INTERSECTION IMPROVEMENTS*

Improvements	Cost
Install Street Lighting	$2,000 - $3,000 per pole
Install Traffic Signals at Unsignalized Intersection	$55,000 - $95,000
Rumble Strips	$3,500 per leg of intersection
Install Advance Warning Devices (see MUTCD)	$3,000 each for flashing light
Install 12-inch Signal Lenses	$130 per section; backplate $70 each
Install Overhead Signals	$55,000 - $95,000; mast arms $8,000 - $10,000 for signal post
Adjust Signal Phasing	$1,000 - $4,000
Provide All-Red Clearance Phase	$1,000 - $4,000
Install Signal Acutation (for both intersection and left turns)	$1,000 - $4,000
Re-Time Signals	$1,000 - $4,000
Provide Signal Progression (1 mile in each direction or cost per intersection)	$2,000 - $5,000 per intersection
Provide Left-Turn Signal Phases	$10,000 - $15,000
Channelize Intersection	$100,000 - $500,000
Install Stop Signs	$200 each
Widen Lanes (cost per lane)	$200,000 - $350,000 per mile, which includes widening & resurfacing; widening only $20-$30 per square yard
Relocate Islands	$3,000 - $5,000 each
Improve/Install Pavement Markings	$3,000 - $4,000 for thermoplastic; $1,500 - $2,000 for paint
Install Median Divider	$50 - $75 per linear ft., New Jersey Barrier only
Provide Turning Bays/Lanes	$50,000 - $125,000 per turning bay/lane
Improve Turning Radii	$5,000 - $15,000
Install Controller	$5,000 - $10,000
Grade Separation at Intersection	$1,000,000 and up

*Information provided by the Illinois Department of Transportation, District 2 (1995).

APPENDIX B:
ACCIDENT PATTERNS, THEIR PROBABLE CAUSE AND GENERAL COUNTERMEASURES

Excerpted from:

Federal Highway Administration
Highway Safety Engineering Studies, 1981

THE TRAFFIC INSTITUTE
NORTHWESTERN UNIVERSITY

Accident Pattern Tables

A. Purpose

The purpose of this procedure is to identify feasible countermeasures based on defined accident patterns at a study location. Using findings obtained from the accident summaries and field review, and supplemented by the traffic, environment, and special study procedures candidate countermeasures can be developed.

B. Application

The development of accident pattern tables is based on the following assumptions:

- Patterns of accident types are associated with probable accident causes.
- The need for specific improvements can be inferred from analysis of probable accident causes.

Using these assumptions, accident pattern tables can be developed. The background for the tables are based on traffic safety engineering experience, the past experiences and evaluations of agencies, and the results of various research conducted throughout the United States.

Accident pattern tables have been developed by various groups. These tables are summarized in Table B-1 which provides a general accident pattern table to assist in the development of countermeasures.

- Use of Tables

  In using these tables or locally developed tables, accident patterns and probable accident causes, as identified from previous activities, are used to identify a list of general countermeasures. For example, at a signalized intersection, it was determined that a pattern of right angle collisions occurred. From previous activities, the probable accident cause was identified as "restricted sight distance".

  The list of general countermeasures associated with these accident causes was obtained from Table B-1.

  -Remove sight obstructions.
  -Restrict parking near corners.
  -Install stop signs and remove signals (see MUTCD).
  -Install advance warning signs (see MUTCD).
  -Reduce speed limit on approaches.
  -Install yield signs (see MUTCD).
  -Channelize intersections.
  -Install advance markings to supplement signs.
  -Install "STOP" lines.

The list of feasible countermeasures is the output of this procedure and is used in further activities to select safety projects.

Other Situations

Where several "probable causes" may have contributed to a particular accident pattern, feasible countermeasures are determined on a collective basis. For instance, in the above example, if "poor visibility of signals": was determined to be an additional or a secondary "probable" cause, the list of general countermeasures would consist of the previous and the following items.

-Install advanced warning devices.
-Install 12-in. signal lenses.
-Install overhead signals.
-Install signal visors.
-Install back plates.
-Improve location of signal heads.
-Reduce speed limit on approaches.
-Add illuminated street name signs.

The findings obtained from the study procedures would produce a list of feasible countermeasures. This list would then be subject to economic analysis to develop a single project.

A similar approach would be used to develop feasible countermeasures where two or more accident patterns are defined at a location. The countermeasures would be assessed collectively to develop feasible countermeasures.

C. Limitations

Advantages:

1. Provides a method which is inexpensive.
2. Tables are simple to use.
3. Requires very little manpower needs.

Disadvantages:

1. May result in incomplete or inconclusive findings.
2. Requires individuals with substantial highway safety experience to develop countermeasures.
3. Is difficult to apply for complex situations.

This procedure requires that an individual experienced in highway safety be used for of feasible countermeasures. This process has been found favorable for most locations due to its low cost and ease of application. Where situations are complex, an alternate method, such as the team approach, may be more favorable.

D. Findings

This Procedure is conducted to develop a list of feasible countermeasures for a location based on the identified accident patterns and probable causes. The output will be used as input in the economic analysis and project selection.

TABLE B-1
GENERAL ACCIDENT PATTERN TABLE

Accident Pattern	Probable Cause	General Countermeasure
Left-turn head-on collisions	Large Volume of left-turns	• Create one way street • Widen Road • Provide left-turn signal phases • Prohibit left-turn • Reroute left-turn traffic • Channelize intersection • Install stop signs (see MUTCD) • Revise signal sequence • Provide turning guidelines (if there is a dual left-turn lane) • Provide traffic signal if warranted by MUTCD • Retime signals
	Restricted sight distance	• Remove obstacles • Provide adequate channelization • Provide special phase for left-turning traffic • Provide left-turn slots • Install warning lights • Reduce speed limit on approaches
	Too short amber phase	• Increase amber phase • Provide all red phase
	Absence of special left-turning phase	• Provide special phase for left-turning traffic
	Excessive speed on approaches	• Reduce speed limit on approaches
Rear-end collisions at unsignalized intersections	Driver not aware of intersection	• Install/improve warning signs
	Slippery surface	• Overlay pavement • Provide adequate drainage • Groove pavement • Reduce speed limit on approaches • Provide "slippery when wet" signs
	Large numbers of turning vehicles	• Create left- or right-turn lanes • Prohibit turns • Increase curb radii
	Inadequate roadway lighting	• Improve roadway lighting

TABLE B-1
(continued)
GENERAL ACCIDENT PATTERN TABLE

Accident Pattern	Probable Cause	General Countermeasure
Rear-end collisions at unsignalized intersections	Excessive speed on approach	• Reduce speed limit on approaches
	Lack of adequate gaps	• Provide traffic signal if warranted (see MUTCD) • Provide stop signs
	Crossing pedestrians	• Install/improve signing or marking of pedestrian sidewalks
Rear-end collisions at signalized intersections	Slippery surface	• Overlay pavement • Provide adequate drainage • Groove pavement • Reduce speed limit on approaches • Provide "slippery when wet" signs
	Large number of turning vehicles	• Create left- or right-turn lanes • Prohibit turns • Increase curb radii • Provide special phase for left-turning traffic
	Poor visibility of signals	• Install/improve advance warning devices • Install overhead signals • Install 12-in. signal lenses (see MUTCD) • Install visors • Install back plates • Relocate signals • Add additional signal heads • Remove obstacles • Reduce speed limit on approaches
	Inadequate signal timing	• Adjust amber phase • Provide progression through a set of signalized intersections • Add all-red clearance
	Unwarranted signals	• Remove signals (see MUTCD)
	Inadequate roadway lighting	• Improve roadway lighting

TABLE B-1
(continued)
GENERAL ACCIDENT PATTERN TABLE

Accident Pattern	Probable Cause	General Countermeasure
Rear-end collisions at signalized intersections	Crossing pedestrians	• Install/improve signing or marking of pedestrian crosswalks • Provide pedestrian "WALK" phase
Right-angle collisions at signalized intersections	Restricted sight distance	• Remove sign obstructions • Restrict parking near corners • Install warning signs (see MUTCD) • Reduce speed limit on approaches • Channelize intersections • Install advance marking to supplement signs
	Excessive speed on approaches	• Reduce speed limit on approaches • Increase amber phase • Install rumble strips
	Poor visibility of signal	• Install advance warning devices • Install 12-in. signal lenses • Install overhead signals • Install visors • Install back plates • Improve location of signal heads • Add additional signal heads • Add illuminated name signs
	Inadequate signal timing	• Adjust amber phase • Provide all-red clearance phase • Add multi-dial controller • Install signal actuation • Retime signals • Provide progression through a set of signalized intersections
	Inadequate roadway lighting	• Improve roadway illumination
	Inadequate advance intersection warning signs	• Install advance intersection warning signs
	Large total intersection volume	• Retime signals • Add traffic lane
Right-angle collisions at unsignalized intersections	Restricted sight distance	• Remove sight obstructions • Restrict parking near corners • Install stop signs (see MUTCD) • Install warning signs (see MUTCD) • Reduce speed limit on approaches

TABLE B-1
(continued)
GENERAL ACCIDENT PATTERN TABLE

Accident Pattern	Probable Cause	General Countermeasure
Right-angle collisions at unsignalized intersections	Restricted sight distance	• Install signal (see MUTCD) • Install yield signs (see MUTCD) • Channelize intersection • Install advance markings to supplement signs • Install limit lines
	Large total intersection volume	• Install signal (see MUTCD) • Reroute through traffic
	Excessive speed on approaches	• Reduce speed limit on approaches • Increase amber phase • Install rumble strips
	Inadequate roadway lighting	• Improve roadway illumination
	Inadequate advance intersection warning signs	• Install advance intersection warning signs
	Inadequate traffic control devices	• Upgrade traffic control devices • Increase enforcement
Pedestrian-vehicle collisions	Restricted sight distance	• Remove sight obstructions • Install pedestrian crossings • Install/improve pedestrian crossing signs • Reroute pedestrian paths • Prohibit curb parking near crosswalks
	Inadequate protection for pedestrians	• Add pedestrian refuge islands • Install pedestrian barriers
	School crossing area	• Use crossing guards at school crossing areas
	Inadequate signals	• Install pedestrian signals (see MUTCD)
	Inadequate phasing signal	• Change timing of pedestrian phase

TABLE B-1
(continued)
GENERAL ACCIDENT PATTERN TABLE

Accident Pattern	Probable Cause	General Countermeasure
Pedestrian-vehicle collisions	Driver had inadequate warning of frequent mid-block crossings	• Prohibit parking • Install warning signs • Lower speed limit • Install pedestrian barriers
	Inadequate pavement markings	• Install thermoplastic markings • Supplement markings with appropriate signing (see MUTCD) • Upgrade pavement markings (see MUTCD)
	Inadequate gaps at unsignalized intersections	• Install traffic signal, if warranted by MUTCD • Install pedestrian crosswalk and signs • Install pedestrian "WALK-DON'T WALK" signals
	Inadequate roadway lighting	• Improve roadway lighting
	Excessive vehicle speed	• Reduce speed limit • Install proper warning signs • Install pedestrian barriers • Enforcement
Run-off-roadway collisions	Slippery pavement	• Overlay existing pavement • Provide adequate drainage • Groove existing pavement • Reduce speed limit • Provide "slippery when wet" signs
	Roadway design inadequate for traffic conditions	• Widen lanes • Relocate islands • Close curb lanes • Install guardrails
	Poor delineation	• Improve/install pavement markings • Install roadside delineators • Install advance warning signs
	Inadequate roadway lighting	• Improve roadway lighting
	Inadequate shoulder	• Upgrade roadway shoulders

TABLE B-1
(continued)
GENERAL ACCIDENT PATTERN TABLE

Accident Pattern	Probable Cause	General Countermeasure
Run-off-roadway collisions	Improper channelization	• Improve channelization
	Inadequate pavement markings	• Perform road surface repair
	Poor visibility	• Increase size of signs
	Excessive speed on approaches	• Reduce speed limit
Fixed object collisions	Obstructions in or too close to roadway	• Remove obstacles • Install barrier curbing • Install breakaway features to light poles signposts, etc. • Protect objects with guardrail • Install crash cushioning devices
	Inadequate roadway lighting	• Improve roadway lighting
	Inadequate pavement marking	• Install reflectionized pavement lines
	Inadequate signs, delineators and guardrails	• Install reflectionized paint and/or reflectors on the obstruction
	Inadequate road design	• Provide proper superelevation • Improve superelevation at curve • Install appropriate warning signs and delineators
	Slippery surface	• Improve skid resistance • Provide adequate drainage • Provide "slippery when wet" signs • Provide wider lanes
	Excessive vehicle speed	• Reduce speed limit
Collisions with parked or parking vehicles	Improper pavement markings	• Paint parking stall limits 7 feet from curb face
	Improper parking clearance at driveways	• Post parking restrictions near driveways

TABLE B-1
(continued)
GENERAL ACCIDENT PATTERN TABLE

Accident Pattern	Probable Cause	General Countermeasure
Collisions with parked or parking vehicles	Angle parking	• Convert angle parking to parallel parking
	Excessive vehicle speed	• Reduce speed limit if justified by spot speed studies • Widen lanes
	Illegal parking	• Enforcement
	Improper parking	• Prohibit parking • Create off street parking
	Large parking turnover	• Create one-way streets • Reroute through traffic
Sideswipe or head-on collisions	Inadequate roadway design	• Create one-way streets provide wider lanes
	Improper road maintenance	• Perform necessary road surface repairs
	Inadequate shoulders	• Improve shoulders
	Excessive vehicle speed	• Reduce speed limit • Install median devices • Remove constriction such as parked vehicles
	Inadequate pavement markings	• Install or refurnish center lines, lane lines and pavement edge lines • Install reflectionized lines, edges
	Inadequate channelization	• Install acceleration and deceleration lanes • Channelize intersection • Provide turning bays
	Inadequate signing	• Place direction and lane change signs to give proper advance warning • Add illuminated name signs

TABLE B-1
(continued)
GENERAL ACCIDENT PATTERN TABLE

Accident Pattern	Probable Cause	General Countermeasure
Driveway-related collisions	Left-turning vehicles	• Install median devices • Install two-way left-turn lanes
	Improperly located driveway	• Regulate minimum spacing of driveways • Regulate minimum corner of clearance • Move driveway to sidestreet • Install curbing to define driveway location • Consolidate adjacent driveways
	Right-turning vehicles	• Provide right-turn lanes • Restrict parking near driveways • Increase the width of driveways • Widen through lanes • Increase curb radii
	Large volume of through traffic	• Move driveway to side street • Construct a local service road • Reroute through traffic
	Large volume of driveway traffic	• Signalize driveway • Provide acceleration and deceleration lanes • Channelize driveway
	Restricted sight distance	• Remove sight obstructions • Restrict parking near driveway • Install/improve street lighting • Reduce speed limit
	Inadequate roadway lighting	• Improve street lighting
	Excessive speeds on approaches	• Reduce speed limit
Train-vehicle accidents	Restricted sight distance	• Remove sight obstructions • Reduce grade • Install train actuated signals (see MUTCD) • Install stop signs (see MUTCD) • Install advance warning signs (see MUTCD) • Install automatic flashers and gates

TABLE B-1
(continued)
GENERAL ACCIDENT PATTERN TABLE

Accident Pattern	Probable Cause	General Countermeasure
Train-vehicle accidents	Poor visibility	• Improve roadway lighting • Increase size of signs
	Improper traffic signals pre-emption timing	• Retime traffic signals
	Excessive vehicle speeds on approaches	• Revise speed limit
	Inadequate pavement markings	• Install advance markings to supplement signs • Install limit signs • Install/improve pavement markings
	Slippery surface	• Skidproof roadway
	Improper pre-emption of RR signals or gates	• Retime RR signals and gates
	Rough crossing surfaces	• Improve crossing surface
	Sharp crossing angle	• Rebuild crossing with proper angle
Wet-pavement accidents	Slippery pavement	• Overlay existing pavement • Groove existing pavement • Reduce speed limit • Provide "slippery when wet" signs • Skidproof roadway
	Inadequate drainage	• Provide adequate drainage
	Inadequate pavement markings	• Upgrade pavement markings
Night accidents	Poor visibility or lighting	• Install/improve street lighting • Install/improve delineation markings • Install/improve warning signs
	Poor sign quality	• Upgrade signing • Provide illuminated signs
	Inadequate channelization or delineation	• Install pavement markings • Improve delineation markings • Provide raised markers • Upgrade advance warning signing